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The ARCHITECTURAL REVIEW
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THE PARTHENON, WEST FRONT AND NORTH SIDE

From Greek Refinements—Studies in Temperamental Architecture, by William H. Goodyear, M. A.

GREEK PROPORTIONS THEORETICALLY AND OTHERWISE

BY EGERTON SWARTWOUT, F. A. I. A.

I AM always interested in speculation. This is not to be construed, as the specification writers say, to mean an interest in Wall Street or in the graphs and tables which always conclusively show that activity in the building trades will not be general until the heavy solid line representing the price of labor more nearly approaches the curve of a dotted line which stands for something else, but I have always had a keen interest in that particular form of speculation which finds its expression in an attempt to show just what led an architect, or an artist either, to do a certain thing in a certain way; and so I have been interested for some time past in the endeavors of various gentlemen to show that the design of a Greek temple or of a Greek vase was really the simplest thing in the world; was purely a mathematical process, so to speak; one had only to take a square or a rectangle and whirl it round like a pinwheel and there you were. Simple indeed! And could be, and perhaps was, taught in correspondence schools. You can picture Iktinos coming into the office late after a hard night and sitting down at his desk, no need of a drawing board there, and taking a few whirls out of a square, dictating a short note of instructions to his stenographer, and calling it a day. The Parthenon was designed—just like that. Easy—why, nothing to it!

How sad it is to think we have wasted tracing

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paper and burned the midnight Mazda all for nothing, and how curious this obvious fact should not have been discovered before. And in that con-

Iktinos takes a few whirls out of a square and calls it a day

nection (this specification English will persist) I would like to sound a note of warning to Mr. Hambidge et al that there is grave evidence to warrant the impression that they may be guilty of plagiarism. I have heard from an apparently authentic source that Captain Walter E. Traprock, F. R. S. S. E. U. in a description of an early trip to the Filbert Islands, advanced the theory that the nests of the Fatu Liva bird were scrupulously laid out on a multiple system using the egg as a module—it is to be remembered that the eggs of this remarkable bird are square—and that the quaint markings on the eggs arranged in mathematical progression established the co-efficient of expansion or bending moment of the nest. Unfortunately there were difficulties in the way of a complete demonstration of this theory as the nests were in such a ruinous state that their lateral and vertical dimensions could not be accurately determined; but it was a pretty theory none the less, and there is much to warrant the belief that an early Greek architect might have been cast away on these charming islands and learned the secret from these

The nests of the Fatu Liva bird were laid out on a multiple system, using the egg as a module

intelligent birds. And even if it is true that the lateral and vertical dimensions of the nests cannot be accurately determined, what of that? Are not most Greek temples in the same condition? Captain Traprock may well place his case in the hands of the Committee on Practice.

BUT to revert to the theory of Dynamic Symmetry and the speculations thereon, I have just read an article in The American Architect and The Architectural Review* on the subject by Mr. James A. Kane, which not only gives easy directions showing how to lay out a building by a rope, by roping it as it were, a quaint method which if put in general practice would go far toward relieving the lack of employment now so prevalent among the ranches of Colorado, and would also lend a spice of color to those drab sections of the Bronx and Brownsville to which our housing developments are chiefly confined; but Mr. Kane, as I started to say, does not merely confine his article to telling you how to do it, he really does it, and for a tail-piece gives a practical example of a civic center, or is it a railroad station?† It cannot be a State Capitol—but anyway the design is there and I have no doubt that a careful search among the squares and diagonals would reveal the title or give some clue to its real meaning. It may well be that the enclosing rectangle, which with its diagonals resembles the back of an envelope, may be a subtle indication that the building is a Post Office; but it is uncertain, and I suppose this very uncertainty is part of the charm of the idea. When one starts whirling a square one never knows. Iktinos for instance might have whirled his too far around, and drawn a theatre or a Greek vase instead of stopping in the temple sector. Still it is an interesting theory, and the results, as the illustration shows, are masterly.

Mr. Kane in the text which accompanies his engravings says that no one will acknowledge that the leaders of our profession nowadays are inferior to the Greeks in artistic ability and therefore they, the Greeks, must have obtained their ultimate perfection, the absolute of the Parthenon, by the assistance of a method of which we are ignorant, and this method must have been his method, or rather Mr. Hambidge's. Now to my way of thinking the whole trouble with the exponents of this system, or of any system which presupposes a mathematical formula as the inception of what we may call design, the whole trouble is that these gentlemen, not being designers themselves, with all due apologies of course to the authors of the tail-piece above referred to, cannot put themselves in the state of mind of an artist, or of an architect, who is producing an original conception. Their method is deductive; the other is intuitive. They start with an accomplished fact, the Parthenon, for example, as it is shown in elevation only, on a restoration which may or may not be correct, and they square it and diagonal it and finally arrive at a certain theory of proportion based on the relation of its areas and of its parts. Naturally all buildings, all things that are dimensional, have certain relations and proportions. It may happen, and it often does

**Issue of October 12, 1921, No. 2378, page 261.*

† See page 265, issue October 12, 1921.

happen, that these relations take the form of curiously exact mathematical ratios, but this fact does not prove that the building was designed by mechanical adherence to this formula. Mr. Kane in his article states that the rectangle used as the basis of the design of the Parthenon was "a rectangle composed of a square plus the rectangle whose length was the diagonal of two squares on its end." It is a puzzle to me just how this statement can be proved. Such a demonstration must be of necessity graphic. Now I know as a practical fact that it is impossible to scale accurately at less than a scale of three-quarters of an inch to a foot. Even at this scale a mistake of an inch or so in a hundred feet would not be surprising. But in measuring the intersections of a long diagonal with a vertical or horizontal on account of the acute angle formed, it would be very easy to make a mistake or variation of three or four inches. In other words in order to show that this theory of proportion will fit the Parthenon it would be necessary to make a scrupulously exact drawing of the two façades and a plan of the Parthenon at three-quarter scale, and even with these enormous drawings and with the employment of the greatest care the result would be only an approximation. In the case of most of the other temples it would not be an approximation, it would be a guess; for while we are in possession of the exact measurements of the Parthenon, our knowledge of the dimensions of the other temples is generally very incomplete; the measurements exactly obtainable are few and in some instances even the height of the order is problematical. Therefore the statement that this or any particular theory is applicable to Greek work is at least an approximation in the Parthenon and a mere guess in other work.

LET us assume for the sake of argument that it could be proved that this theory was applicable to all Greek work. These questions then arise: (1) Why should the proportions of all Greek temples vary if the Greeks were in the possession of a sovereign short-cut to ready made design? (2) Was this mysterious rectangle handed down on a table of stone from Olympus in the Mosaic fashion or was it the result of tradition and experiment? (3) Why was the selection of this particular rectangle made in the case of the Parthenon and why not some other shape? (4) How was the principle applied when adopted, and (5) how can a theory of proportion based on two dimensions be applied to a building which has three? A definite answer would be interesting, but I am afraid we may hope only for vague generalities.

Now I don't question that there is some element of truth in it all, but it is only a half truth, or perhaps a tenth truth. And as in innumerable other instances this half or tenth truth has been so magnified and its real meaning so warped that the whole fabric falls in spite of the poor little pillar of truth at the bottom. Greek temples were generally rectangular in plan. It was a natural form, and probably tended to become to a certain extent standardized. The form and general arrangement may have been dictated by some religious observances or by some tribal tradition of which we are ignorant, and it is conceivable that in time these rituals and traditions may have been expressed in some such method as advanced by Mr. Hambidge, that is to say the ground plan may have been approximated but not absolutely dictated by a method of squares or portions thereof—but there it ended. It could by no conceivable means be extended to their vertical dimensions. I am told that in Japan rooms are, or were, dimensioned by the number of mats it took to cover the floor, and that in their temple architecture a room of certain dimensions had to be of a certain height. Here is standardization in another, but in a similar, form. The Greeks were temple builders; their architecture was extremely simple, and they generally adhered to one type, the rectangular Doric temple. To the lay mind these temples were very much alike; in reality they differed extremely in proportion and in detail. There was a gradual but very perceptible improvement in design from the clumsy primitive form to the grace and strength of the Parthenon. This improvement was due, as such improvement always is due, to a careful study of the defects of work already executed. The architects were undoubtedly familiar with all the other temples in existence, and they undoubtedly had their complete dimensions and also probably models of their detail. They felt a certain temple was too low or too high or too heavy and in the new temple they endeavored to correct these defects. It may be that the measurements they had of these temples were not all linear. They may have had a certain modular method of expressing their proportion, and this modular method may have been not only linear but may have been based on a proportion of areas; but this could only apply to the plan. The statement that the Greeks had no means of making linear measurements is ridiculous. The men who laid out the Parthenon with an average builder's error of two-tenths of an inch were no tyros with the tape. But the important fact in regard to these modular or dimensional proportions, a fact which is either unknown to, or disregarded by, the proponents of the theories under discussion, is that they were only methods of recording the proportions of work already done, and that they were not the rules under which the work was actually done. For example, a set of measurements of the Parthenon in feet and

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inches, no matter how carefully made, would be of but little use to an architect unless he wanted to reproduce the Parthenon or some of its columns at exactly the same size as the original. In order to be of use for a different sized column, the linear dimensions must be reduced to modular dimensions, and similarly, as the temples were never of the same size, a method of proportions in area would be of advantage, particularly if they could be expressed in a simple way. It may even be imagined that vertical dimensions were sometimes expressed in relation to the area of the building or one of its sides or even a diagonal. I don't know, nobody knows; but this I do know, if they were ever so expressed it was only for purposes of record.

I THINK I can explain my point of view a little better if I revert to the speculation idea referred to in the opening of this article and venture to advance my own speculations as to how the Greek temple was designed. It is merely the wildest speculation, to be sure, much as Father Brown might have speculated if he had been an architect. In the first place it is fair to assume that the Greek architect had the same general way of approaching a problem as we of today have. Two thousand five hundred years or so is a short step in the history of mankind. The mental processes of the Greeks probably differed little from ours. The Greek architect of the Periclean age started from something definite just as we do, and that something definite was the instructions of his client, the exigencies of the site, and the limitations of the material at his disposal. I don't doubt too the price of it cut quite a figure. When the various projects for the Acropolis were begun under Pericles there was probably a situation comparable to that in Chicago at the time of the World's Fair. Don't imagine that I'm comparing those lath-and-plaster structures to the classic marbles of Greece; but the direction of the work was in the hands of a group of the best men that Greece could produce and they collaborated as well as any group of men could in the work that was to be done. There were probably board meetings presided over by Phidias, and they probably fought among themselves quite as much as any earnest souls of our days would do under similar conditions. Iktinos probably reported on the Parthenon; took up the question of site and the possibility of using the foundations and some of the materials of the old Parthenon, but undoubtedly urged the scrapping of the old work and doing a bigger building.

The question then was how big could they build. A representative of the Pentelic Quarries Co., Ltd., who was present, accidentally of course, stated that his company could furnish Number One stock for the architraves up to say 14′0″, but stipulated the architrave must be split in two or perhaps three vertical slabs. Immediately there was a fight. Iktinos said he'd throw up the job if the thing was going to develop into a commercial proposition, but the Pentelic Quarries Ltd. was quite a power in the Third Ward and with the aid of an elder Archon who had a rather shady record as a lobbyist the thing was put over; but Phidias incurred so much enmity among those higher up that there were open threats that they would get him, as they expressed it in their classic Greek way, and they did get him later on a trumped-up charge of grafting in gold leaf. But that, as R. K. says, is another story.

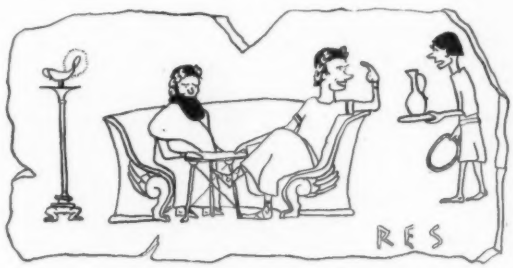
But to resume. Having settled the length of the architrave blocks and thereby establishing in a general way the inter-columniation, Iktinos was asked by the chairman how high his order would be. He said he could not tell exactly, but he thought about thirty to thirty-two feet. It would be a good big scale anyway, but he had been making some studies and had decided to diminish the height of the entablature somewhat, and make the columns a little more graceful, and he thought an octostyle portico would be about right, with say seventeen columns on the flank. There was quite an argument over this; Phidias not liking the idea of reducing the size of the metopes, but Iktinos carried his point by promising to eliminate the triglyphs all together under the portico and to substitute a great sculptured frieze which would really give the sculptors much more opportunity than the small isolated metopes, no matter how large they were. Phidias was delighted, and they adjourned in a body to the Cafe Hellenikon, Iktinos remarking to his partner, "Pretty neat the way I put that over! That damned interior frieze has always bothered me, the triglyphs never would work out, and now they have a chance to make a Pan Athenaic procession out of it and everybody's happy."

Work then began in earnest, the Quarries Company started a large force of men on the architraves, and the rough stock for the ashlar, and the architects made a number of models of the column and entablature of various sizes, trying the new proportions of the entablature and the spacing of the metopes. A number of columns were made, unfluted at first for economy, and finally one was cut in marble and set up in position. There seemed to be a little too much entasis on this one, and another was hurriedly made in rough stone and covered with stucco. A stucco entablature was set up over these columns, and the new plaster was colored to take the curse off it, and the sculptors set one of the metopes. It was now ready for the inspection and final approval of

Pericles, who, after lunch—inspections always take place after lunch—came in great state, and as the colloquial Greek phrase has it, gave it the once over. Generally he liked it, though he thought the top of the triglyph looked a little crude, but Iktinos took a little piece of stock mould, a bead and reed that some modeler had been working on, and applied it to the cast. The effect was fine, and the day saved, and Pericles went home and told Aspasia how he had really designed the Parthenon. "You know, my dear, I'm not an architect, of course, but I do know what I like."

That evening in the Styx Club a prominent Hoplite remarked to Iktinos, "Hail, O Iktinos, (or winged words to that effect) Say, listen, did you really lay out the Parthenon with a rope and a little square dewdad you twisted around, as I saw in the interview in to-night's Argos?"

"Not much I didn't, son, but the dear public likes to be fooled, and if they thought there was no mystery about it and knew it was just hard work and tracing paper, they wouldn't be strong for it; Why, do you know, the other day over in the sculptor's place they were sketching out a model for the East pediment, and some reporter blew in and actually wanted to know what it meant, who the figures were, and all that. Of course they had just made lumps of clay here and there where they wanted the spots and had worked for the shadows, and they didn't know whether that particular spot was a god or a horse; but Phidias was smart, he just named them off and made up a wonderful story, and the joke of it was it was published, and now he has to work that way. It's a great world. Boy! A beaker!"



"It's a great world" said Iktinos, "Boy! A beaker!"

XUM

OUT-DOOR SKETCHING AS A HELP TO THE ARCHITECT

BY T. O. FRAENKEL

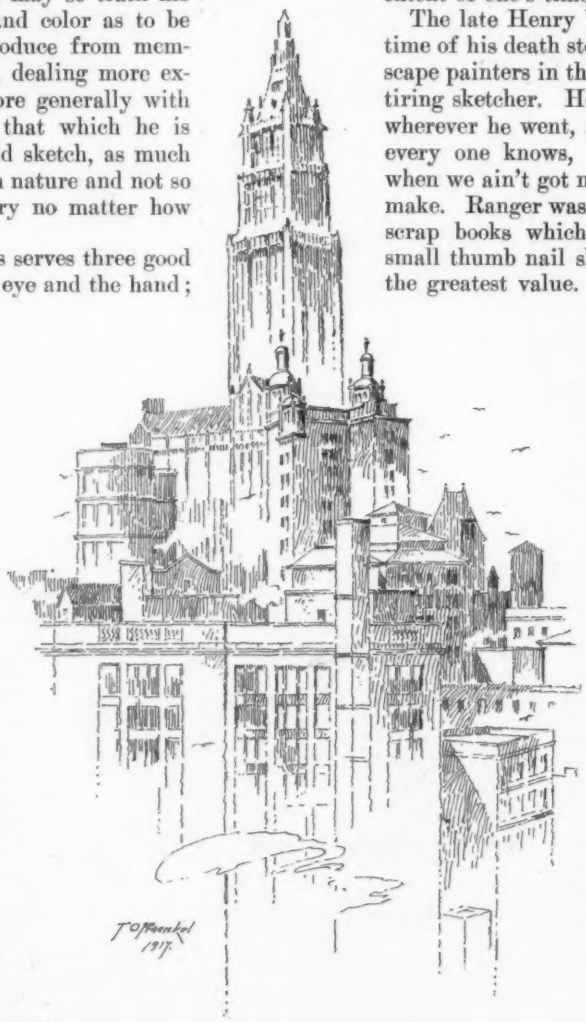
Illustrated by sketches by the author*

ARCHITECTURAL sketching out of doors is a means of inspiration and a source of education. Nothing will more accurately train the eye nor better cultivate the memory. While the artist painter may so train his appreciation for form and color as to be able artistically to reproduce from memory, the artist architect, dealing more exactly with facts and more generally with details, the essence of that which he is striving to collect, should sketch, as much as possible, directly from nature and not so much depend on memory no matter how well it may be trained.

Sketching out of doors serves three good purposes: It trains the eye and the hand; it enables one to accumulate much valuable material and it takes a man out into the open and gives him what he very often neglects, certain healthy physical exercise.

Further, sketching out of doors is a restful recreation. Any man who sketches out of doors knows the absolute absorption of it, knows how it occupies his mind to the exclusion of everything else. There is a sense of refreshment after a day in the open with paint box or sketching pad, that is always something worth while.

The knowledge gained through sketching is in proportion to the persistence with which it is followed. No student—and by student we mean the full rank and file of workers from the office boy to the "boss"—is too young or too old to be unable to benefit by sketching. It may very well become a habit and one different from most, to be encouraged to the fullest possible extent of one's time and opportunity.



Sketch of the Woolworth Tower made from an office window, eighteen stories above street level, half a mile from the building

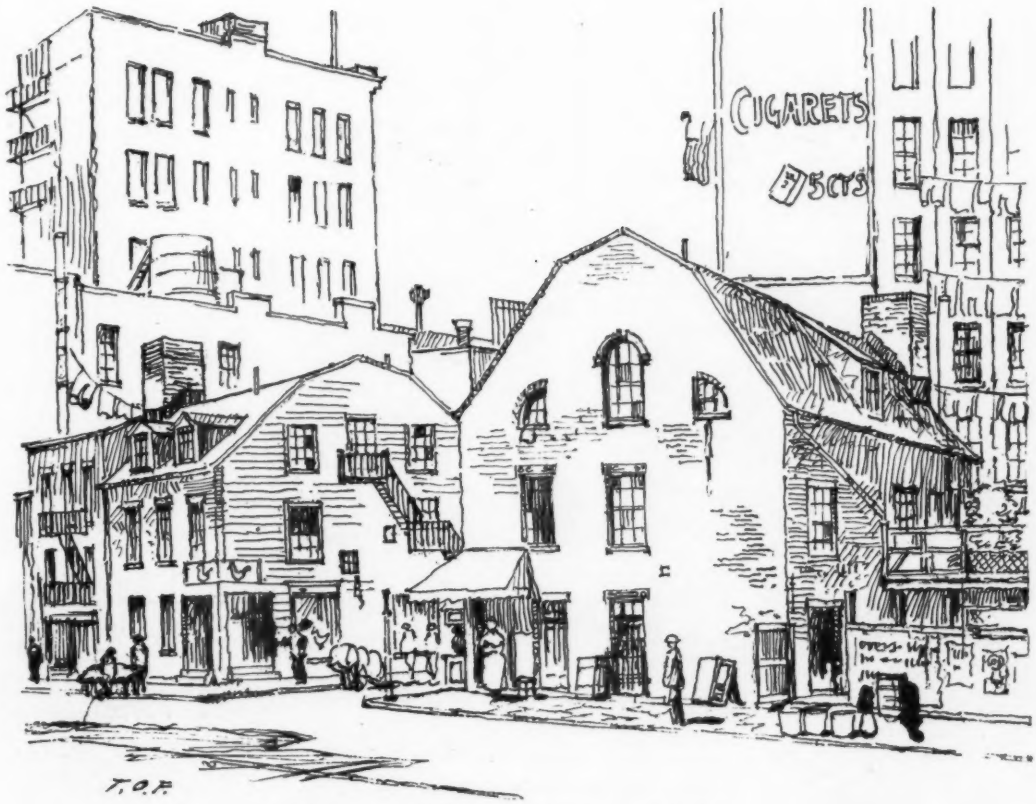
The late Henry W. Ranger, who at the time of his death stood at the head of landscape painters in this country, was a never-tiring sketcher. He always had with him, wherever he went, a small 4 x 5 pad. As every one knows, it's "the shots we see when we ain't got no gun" that we want to make. Ranger was always ready. He left scrap books which contain thousands of small thumb nail sketches. They were of the greatest value. They not only served further to cultivate an already well developed ability to sketch from nature, but they were at all times an almost inexhaustible fund of valuable suggestion.

Every architectural designer knows the value of training the eye and hand to work harmoniously together. It does not greatly matter what one sketches. It is the mental and manual training that counts. Sketching best gives that training.

It can be a landscape of the simplest composition, a rail or stone fence, bushes, or what not. A shadowy grove in the middle distance with sunny fields and the blue hills beyond. The sketcher will not choose this composition unless he finds good proportion in outline and color. Just here is where it is a wonderful help to the seeker after betterment in design, and the practice greatly

The sketches accompanying this article are, in part, preliminary to a series of fifty water color sketches on view at the Historical Society's galleries in this city.

Old house on Queensborough Boulevard—Outlined for Color



Old Houses, Mulberry and Prince Streets, New York

Relics of a once aristocratic section

The Cooper House, Greenpoint, L. I., near Newtown Creek
Outlined for Color

Present state of an old house in Greenwich Village,
(corner of King and Hudson streets) New York

helps in rendering, leading up to assurance and stamps the work with individuality. After dabbing in the open for a period, one may try compositions in the city, for they are to be found in great abundance.

The principle of architecture is to house, and the simplest and most restful work produced is the best. In other words, it is not how much we can pile on a structure; it is just how much we can forego and leave off, and yet secure good composition.

These many motives are all to be found before you in nature. One can strive to get all there is in light and shade and end in a well-balanced picture, and as one advances, he will not overlook a note that is of value, both in color and detail. This description can be applied verbally to all work in the office.

Sketching puts one on good terms and understanding with all things that are worth while in the vast out of doors. One gets to see things properly that formerly were overlooked and will separate that of nature from that of man, and learn to note the use of things and how applied.

Pleading an excuse of not having the subjects to sketch one would like, is often the cry of hometown men. In West Michigan, I once met an artist who complained of not having rocks in his section. New York artists raved over the picturesque beauties of the Chicago River during the World's Fair time. But it took a St. Louis artist, Paul Conoyer, to see and put on canvas the broad, shadowy vistas that lie across the city plazas of New York.

This sketching, as a help to the architect, need not be of a mansion, or a Venetian palace or a Nuremburg house, but just sketching, first in good drawing in form and proportion, and after that perhaps with color and the thrill that always goes with it. The latter is one of the greatest by-products of these efforts and will improve as the drawing shows value in his color work.

The writer maintains that few colors are needed, for with but few to keep track of, one gets to know them and their use. Have in your box, say, two reds, vermillion and light red; two blues, say, cobalt and antwerp; two or three yellows, cadmium, ochre and one other bright yellow; burnt sienna, vandyke brown, emerald and Hookers Green No. 2, one lake or carmine. Avoid all neutrals, grays, whites and blacks, for too many colors in the gamut add to the bewilderment of the worker and retard progress. The colors and pigments that have been eliminated can be easily mixed from those in your box.

It is well known that an artist can be called on to fill in the wants we need in the form of a picture, but that does not advance us one bit in

Old Shops in Fourth Street, Near the Bowery

our knowledge; he may be called on to render inferior work and expected to turn out a beautiful thing when the drawing was not right in its original conception and the blooming thing "won't jell."

Someone has said that the man that cannot do the work properly is not normal; from that we deduce that the man nearest the top is somewhat nearer perfection, and the rest of us are somewhere in the scale. The knowledge gleaned in these efforts of out-door sketching will be carried to the office, and that knowledge will be applied unconsciously to the every-day problems in form, detail and color, and the worker will turn to his office duties with renewed stimulation, with a more cheery manner, and fresh in mind the vision and spirit of the fields. He awakens to the realization that there are other things in store beside the hackneyed rut of common mannerisms that are almost a law in the average office, when he is spurred on to better ideals.

It is, after all, a matter of growth in application and observation in all ways of the recognition of nature, the source of all that is best and good. If this article succeeds in stirring up some dormant workers and proves a help, of which there is no doubt, the writer's best wishes will go with them.

BEAUX-ARTS INSTITUTE OF DESIGN

Official Notification of Awards—Judgment of May 24th, 1921

PROGRAM

CLASS "A"—V PROJET

The Committee on Architecture proposes as subject of this Competition:

"A BANK AND OFFICE BUILDING"

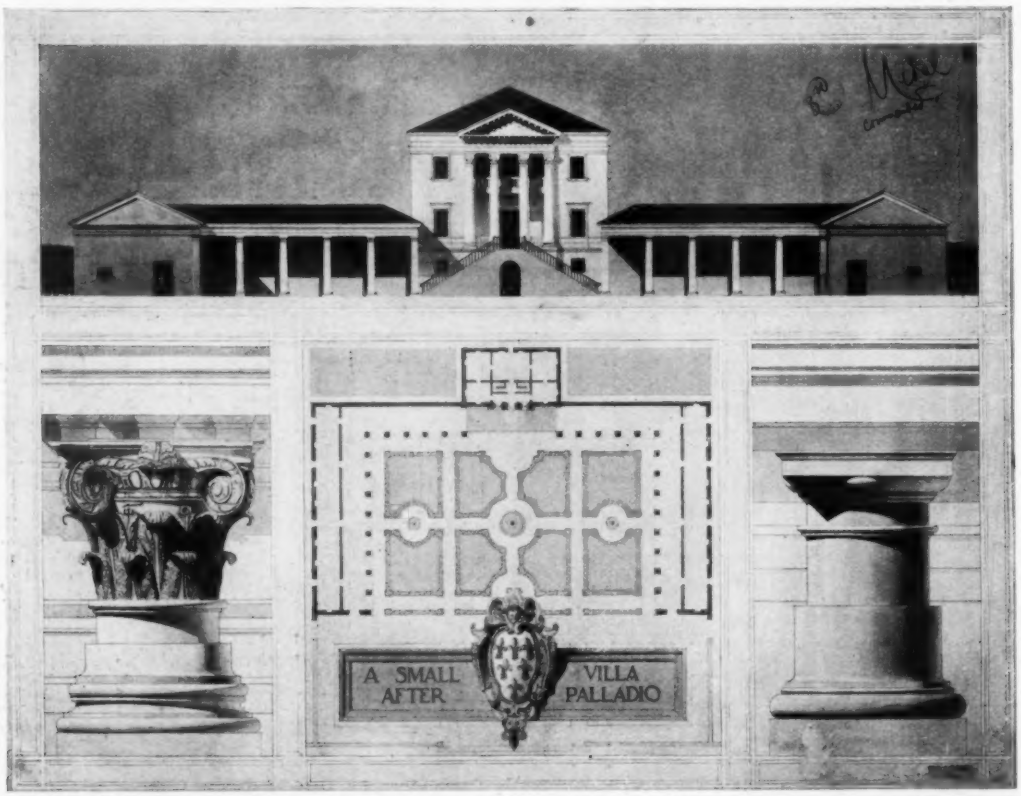
Jury of Award—R. M. Hood, H. Greenley, E. A. Dennison, H. Hornbostel, P. P. Cret, and F. C. Hirons.

Number of Drawings Submitted—54.

AWARDS—

FIRST MEDAL:—G. K. Trautwein and H. J. Toombs, Univ. of Pennsylvania, Phila.; T. F. Price, Atelier Wynkoop, N. Y. C.

SECOND MEDAL:—R. E. Dake and F. K. Draz, Carnegie Inst. of Tech., Pitts.; I. Clavan and G. P. Turner,



P. C. Reed — Carnegie Institute of Technology

3rd MEDAL

Class "A" & "B" Archaeology—V. Projet—A small Villa in the style of Palladio

Univ. of Pennsylvania, Phila.; A. H. Goddard and P. N. Jensen, Atelier Wynkoop, N. Y. C.

MENTION:—L. H. Rank, K. A. Snow, W. J. Perkins, L. E. Considine, L. I. Nusbaum, E. A. Earley, R. V. Murison, J. G. Tood, A. P. Herrmann, C. H. Sorber, and M. Pohlmeyer, Carnegie Inst. of Tech., Pitts.; C. S. Bernard, Chicago Sch. of Archt., Chicago; L. Rombotis, Los Angeles Archtl. Club, Los Angeles; H. S. Atkinson, E. C. K. Schmidt, R. Nickel and L. Z. Slawter, "T" Square Club, Phila.; H. Behlen, K. A. McGrew, A. E. Egeressy, L. R. Price, E. Coscia, A. B. Emery, O. M. Olsen, T. F. Mulrooney, J. J. Healy, D. Royer, R. Spangenberg and D. R. Cochran, Univ. of Pennsylvania, Phila.; D. K. Frohwerk

T. E. Ash — T. Square Club, Philadelphia

3rd MEDAL

Class "A" V. Esquisse—Esquisse—A ceiling Decoration

and W. M. Icenhower, Univ. of Kansas, Lawrence; H. B. Marsh, Atelier Wynkoop, N. Y. C.

H. C.:—L. S. Lashmit, L. J. Rockwell, C. L. DePrefontaine, N. D. Kutchukian and C. W. Hunt, Carnegie Inst. of Tech., Pitts.; A. B. Baumann, Jr. and R. Gleeson, Univ. of Pennsylvania, Phila.; S. J. Makielski, Univ. of Virginia, Charlottesville.

PROGRAM

CLASS "A"—V ESQUISSE-ESQUISSE

The Committee on Architecture proposes as subject of this Competition:

"A CEILING DECORATION"

The ceiling of the lobby of a large hotel consists of a series of groined vaults which, in the case under consideration, are of the usual classic type, i. e., formed by the intersection of two cylindrical vaults.

The character of the hotel permits of an elaborate decorative scheme, and as the ceiling is constructed of plaster, it is possible to treat it either entirely with painted decorations, or with modelling, or with a combination of both.

The ceiling of one bay only of the vestibule is required in this problem. This bay is 20′-0″ in each horizontal dimension.

Jury of Award—H. O. Milliken, M. S. Wyeth, F. C. Farley, J. Wynkoop and T. S. Holden.

Note—This Jury also served as Jury of Award for the Class "B"—V Esquisse-Esquisse, Class "A" and "B" Archaeology—V Projet and Class "A" and "B" Archaeology—V Measured Drawings.

Jury for Awarding the Karnak Temple Chapter of the Scarab Fraternity Prize—H. O. Milliken, M. S. Wyeth, F. C. Farley, and T. S. Holden.

Number of Drawings Submitted—15.

AWARDS—

THIRD MEDAL—T. M. Harllee, Atelier Curtis, New Orleans; T. E. Ash, "T" Square Club, Phila.

MENTION—R. K. Galbraith, Archtl. League of Indianapolis, Indianapolis; W. L. Hindenach and R. Nickel, "T" Square Club, Phila.

PROGRAM

THE KARNAK TEMPLE CHAPTER OF THE SCARAB FRATERNITY PRIZE COMPETITION

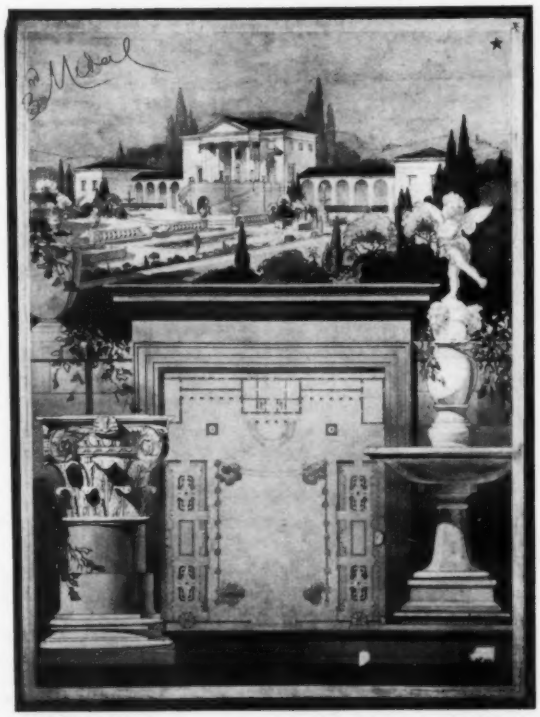
The gift of the Karnak Temple Chapter of the Scarab Fraternity, offered for the best solution of the Fifth Class "B" Esquisse-Esquisse of the season.

PRIZE, $50.00

CLASS "B"—V ESQUISSE-ESQUISSE

The Committee on Architecture proposes as subject of this Competition:

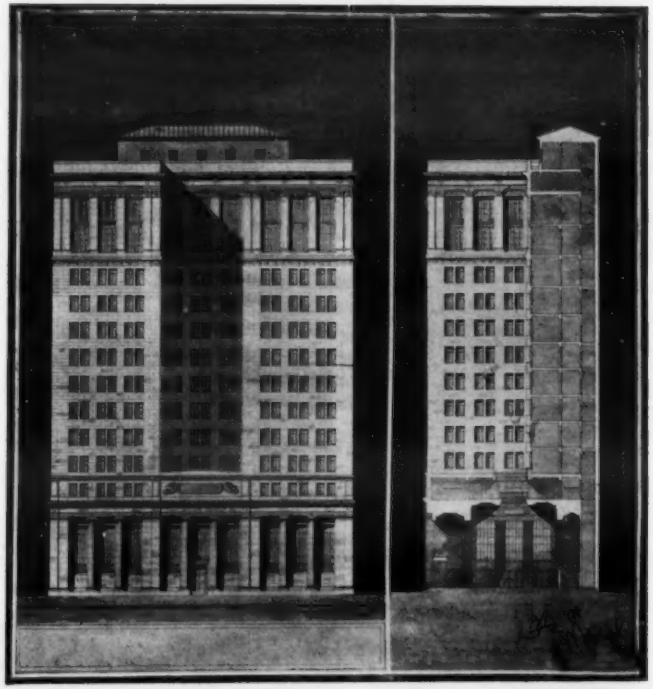
"AN ARTIST'S STUDIO"

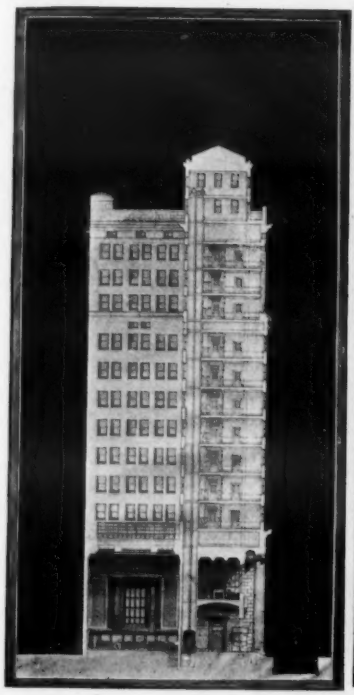


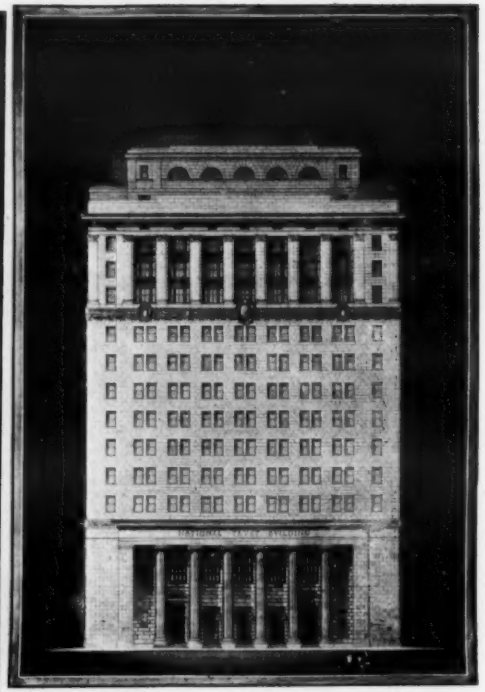
E. W. Klee — Carnegie Institute of Technology

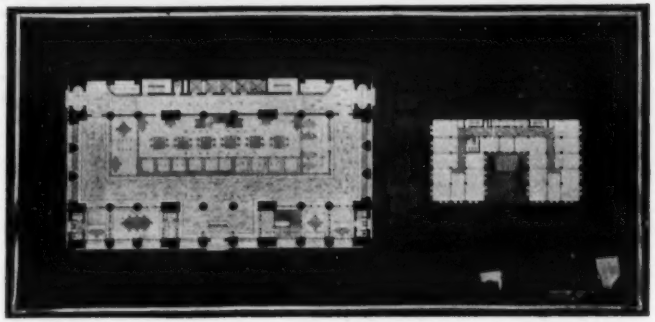
3rd MEDAL

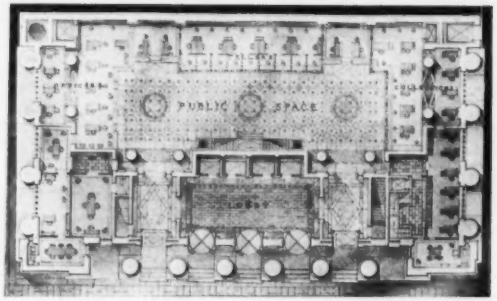
Class "A" and "B" Archaeology—V. Projet—A small villa in the style of Palladio

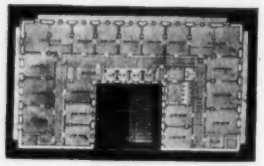












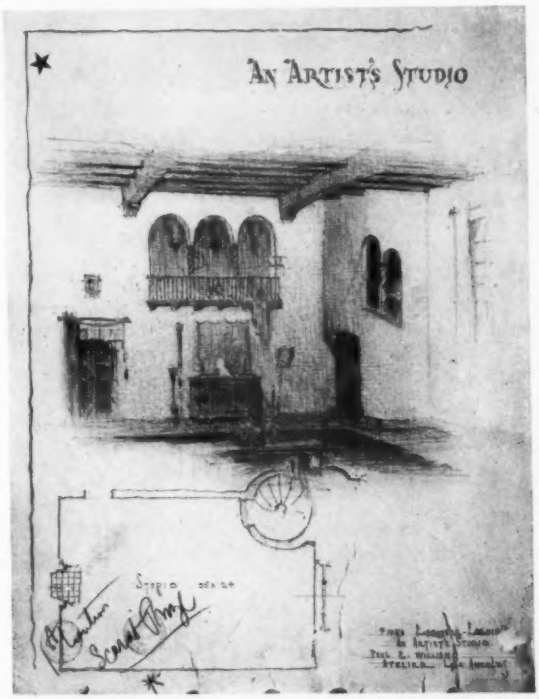
T. F. Price — Atelier Wynkoop — 1st MEDAL

G. K. Trautwein — University of Pennsylvania — 1st MEDAL

Class "A"—V. Projet—A Bank and Office Building—Student work, Beaux-Arts Institute of Design

A luxurious type of studio apartment called "The Duplex," has been developed in many of our large cities. In it, the studio or main living room runs through two stories, the dining room, entrance and service being at the studio level, with the bed-rooms directly above. This arrangement gives the opportunity for an unusual and attractive treatment of the studio, permitting, as it does, the use of interior windows or balconies at the upper level.

In this problem, the studio itself is 35′-0″ long, 24′-0″ wide and 22′-0″ high in the clear. The other rooms of the apartment open on one of the long sides of the studio. The staircase leading to the upper floor may be placed



P. R. Williams — Los Angeles Architectural Club

PRIZE ($50) and 1st MENTION

Karnak Temple Chapter of the Scarab Fraternity Prize Competition
Class "B" V. Esquisse – Esquisse—An artist's Studio

in the studio itself, or shall open directly out of it at the option of the student.

Number of Drawings Submitted—27.

AWARDS—

PRIZE—($50.00)—P. R. Williams, Los Angeles Archtl. Club, Los Angeles.

PLACED FIRST (Disqualified for Prize)—L. F. Fuller, Los Angeles Archtl. Club, Los Angeles.

FIRST MENTION—P. R. Williams, L. F. Fuller and G. Chittenden, Los Angeles Archtl. Club, Los Angeles; H. S. Kelly, Yale Univ., New Haven.

MENTION—T. M. Harllee, Atelier Curtis, New Orleans; C. F. Bieler, R. L. Linder and C. H. Kellogg, Atelier Denver, Denver; M. Sabransky, Los Angeles Archtl. Club, Los Angeles; M. A. Pardo, Yale Univ., New Haven.

PROGRAM

CLASS "A" AND "B" ARCHAEOLOGY—V PROJET

The Committee on Architecture proposes as subject of this Competition:

"A SMALL VILLA IN THE STYLE OF PALLADIO."

No European period or style of architecture is of greater interest to the designers of American homes than that which flourished during the seventeenth century in the north of Italy under the guiding genius of Palladio. It was there that the English architects gained much inspiration and from England in turn sprang the Colonial architecture of the early days of our country. So direct is the line that no one can help being struck by the resemblance between the small Italian villas of the north and the best examples of our southern Colonial work.

The subject of this program is the design of a small villa on the banks of a river in the style of Palladio. The main portion of about 1500 sq. ft. ground area shall contain a basement and two stories and shall be joined to lower wings on either side by colonnaded or arcaded galleries. The site is approximately level with the river to which the gardens lead, the villa being approximately 200′-0″ from its banks.

Number of Drawings Submitted—16.

AWARDS—

THIRD MEDAL—P. C. Reed and E. W. Klee, Carnegie Inst. of Tech., Pitts.; W. R. Fisher, "T" Square Club, Phila.

MENTION—L. C. Page, R. Paterson, W. M. Burke and A. W. Chesterman, Carnegie Inst. of Tech., Pitts.; E. F. Horley, John Huntington Poly. Inst., Cleveland.

CLASS "A" AND "B" ARCHAEOLOGY—V MEASURED DRAWINGS

Number of Drawings Submitted—4.

Subject—The Curtin House Doorway, Bellefonte, Pa.

AWARD—

THIRD MEDAL—C. Hersh, Pennsylvania State College, State College.

Subject—Early Pennsylvania Doorway from Boalsburg, Pa.

AWARD—

THIRD MEDAL—F. O. Paul, Pennsylvania State College, State College.

Subject—Colonial Fireplace in Old Tavern, Linden Hall, Pa.

AWARD—

THIRD MEDAL—H. R. Gamble, Pennsylvania State College, State College.

Subject—Adam Style Mantel Piece in Diller House, Queen Street, Lancaster, Pa.

AWARD—

MENTION—H. T. Hamel, Pennsylvania State College, State College.

XUM

A Street Scene in Providence

(See reproduction of original drawing by O. R. Eggers on opposite page)

WHEN, in 1636, Roger Williams was expelled from Massachusetts, he journeyed along the shores of what is now known as Narragansett Bay. He bought a tract of land from the Indians and founded the town of Providence in Rhode Island.

A complete and distinct separation was made between spiritual and temporal affairs. The religious intoleration that existed in Massachusetts was here set aside and freedom of action in religious matters unequivocally guaranteed.

From the days of its founding up to the present, Providence has been typically New England in its growth and development. This may be noted in the older part of the city where the thoroughfares are narrow and crooked, and where may be found many interesting early American houses similar to the one that has been so admirably sketched by Mr. Eggers.

The high box stoops shown in the illustration are common to New England, and many are to be found in Providence. They mark a certain period of domestic architecture. It is satisfactory to know that the patriotic spirit of the people of Providence is the reason for the conservation of many of these valuable architectural details.

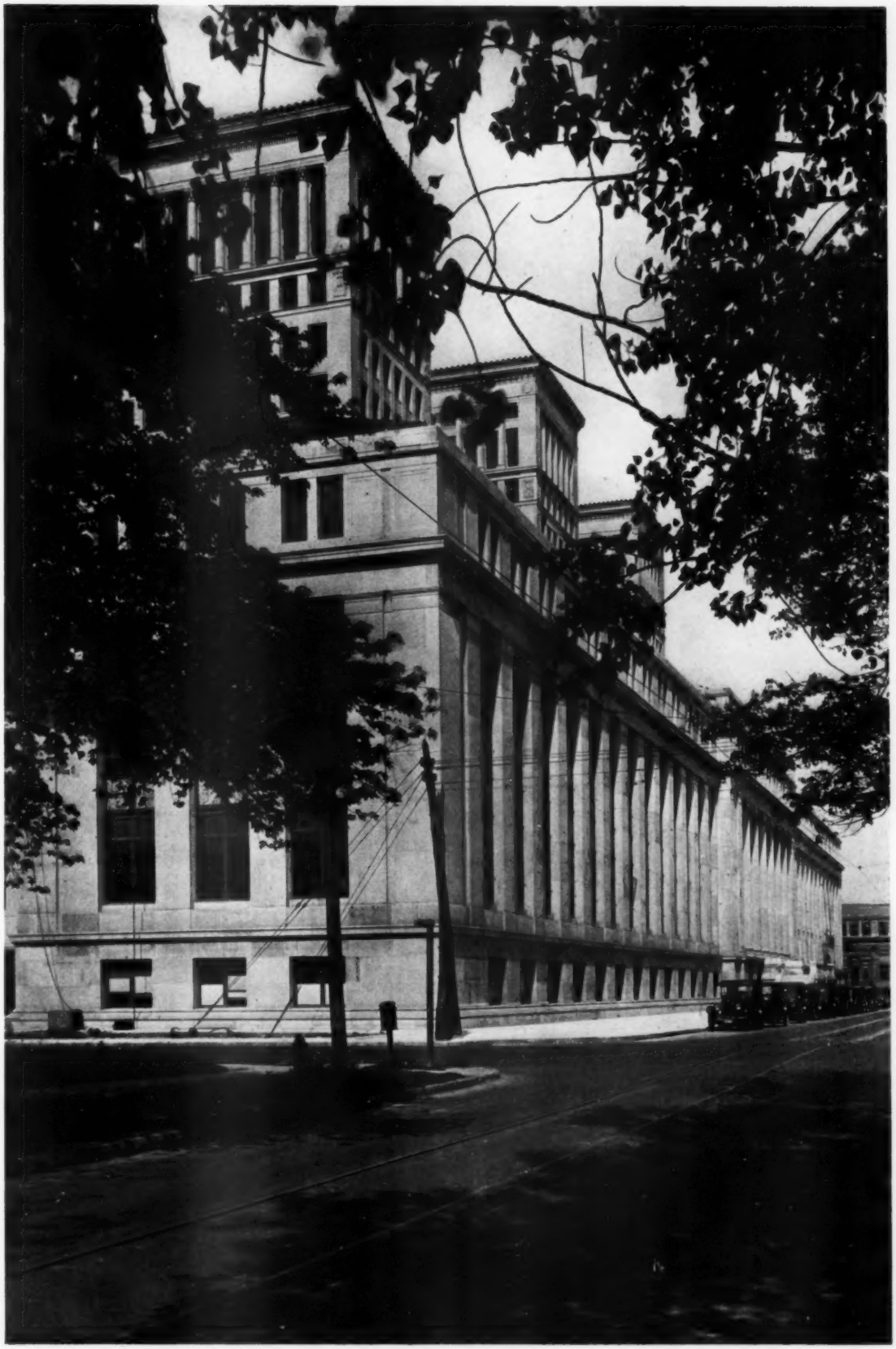
DETAIL OF A HOUSE IN PROVIDENCE, R. I.
THE AMERICAN ARCHITECT Series of Early American Architecture

XUM

BUILDING FOR THE GENERAL MOTORS COMPANY, DETROIT, MICH.

ALBERT KAHN, ARCHITECT

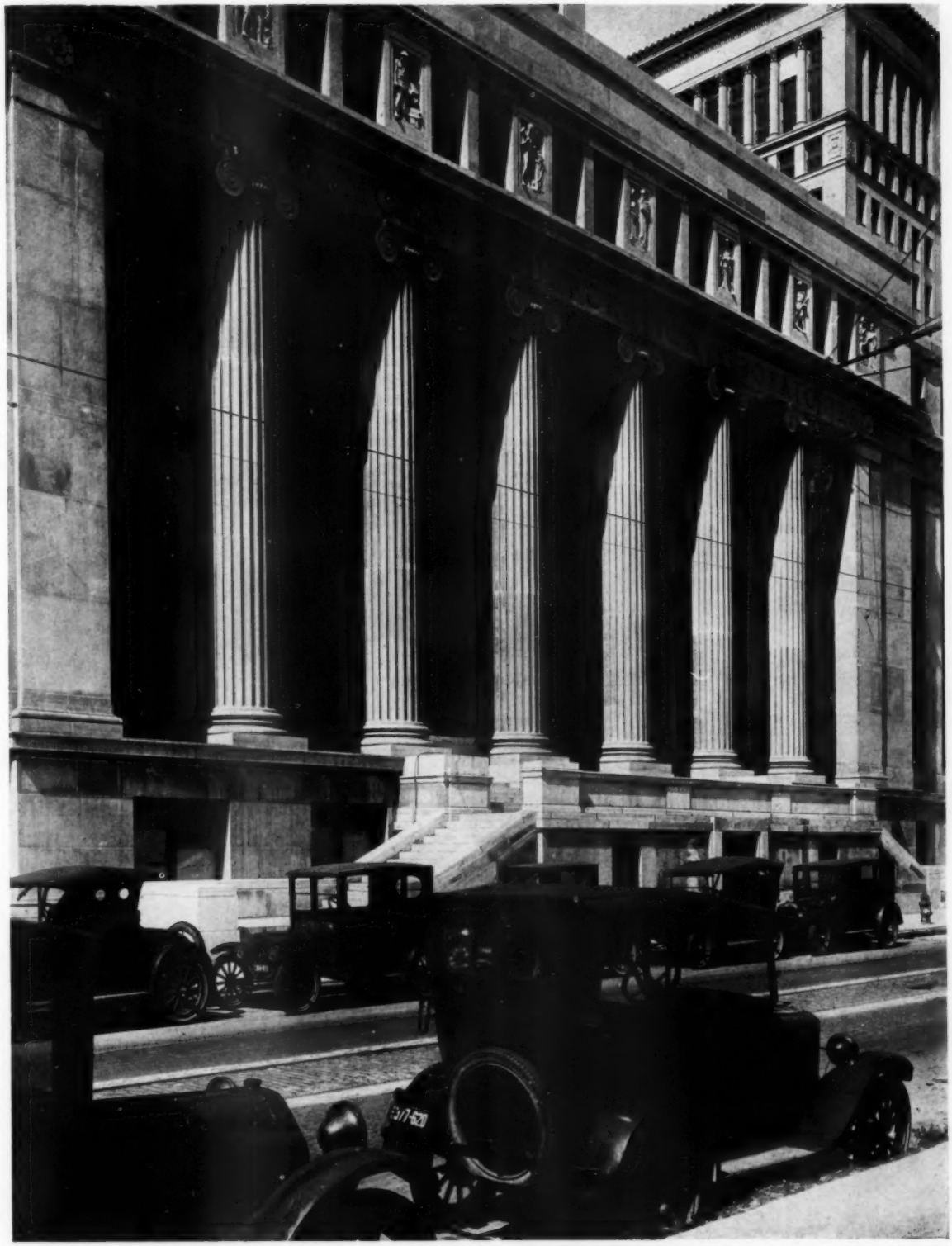
XUM



BUILDING FOR THE GENERAL MOTORS COMPANY, DETROIT, MICH.

ALBERT KAHN, ARCHITECT

XUM



BUILDING FOR THE GENERAL MOTORS COMPANY, DETROIT, MICH.

ALBERT KAHN, ARCHITECT

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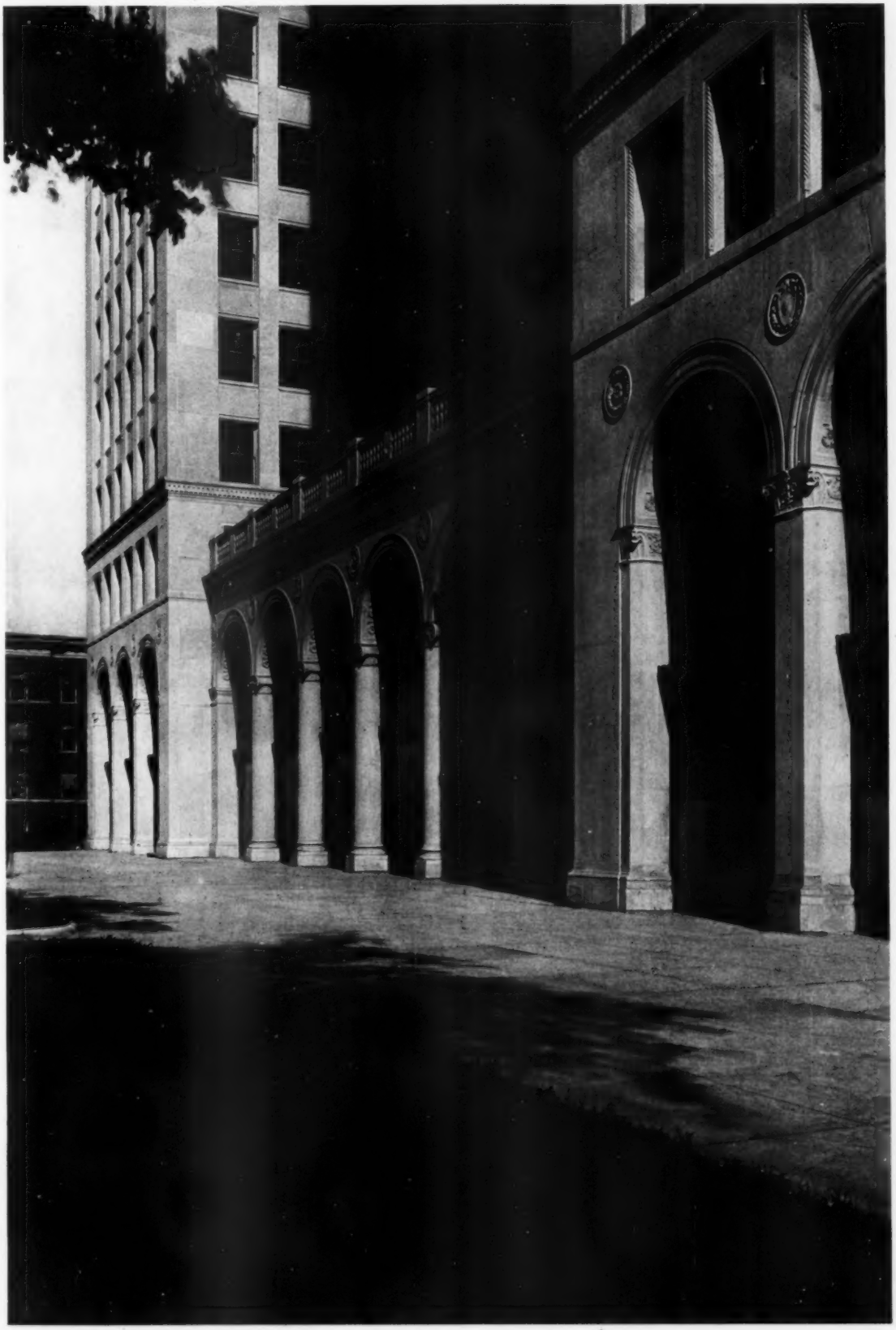

BUILDING FOR THE GENERAL MOTORS COMPANY, DETROIT, MICH.

ALBERT KAHN, ARCHITECT

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BUILDING FOR THE GENERAL MOTORS COMPANY, DETROIT, MICH.

ALBERT KAHN, ARCHITECT

VOL. CXX, NO. 2381 NOVEMBER 23, 1921

DETROIT GOLF CLUB, DETROIT, MICH.

ALBERT KAHN, ARCHITECT

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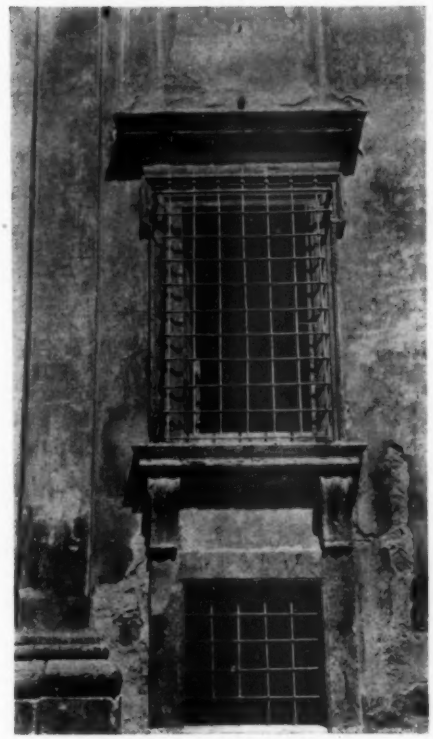
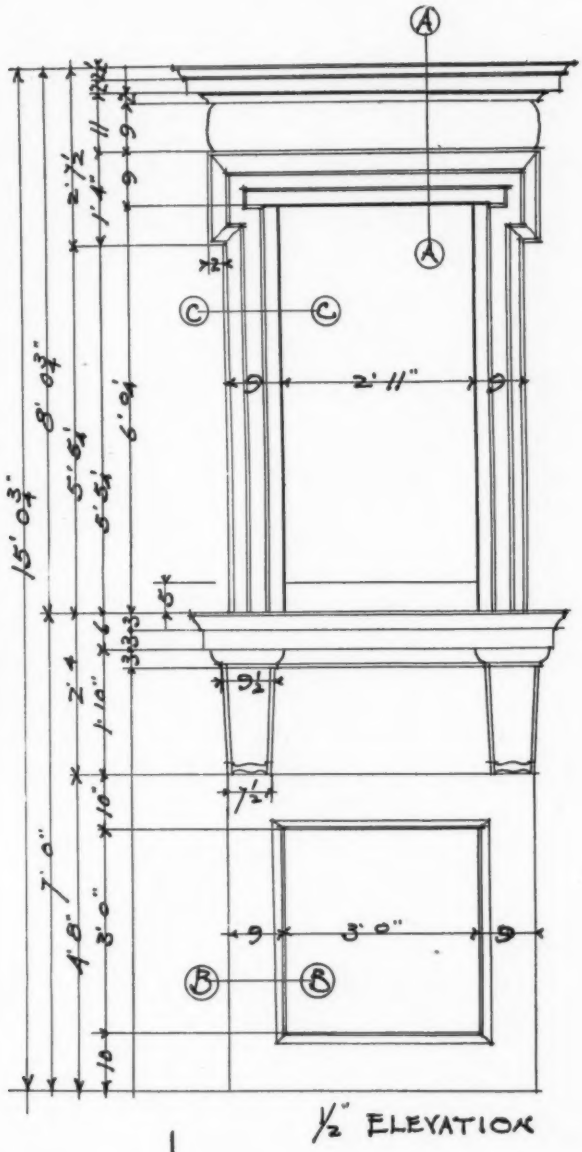
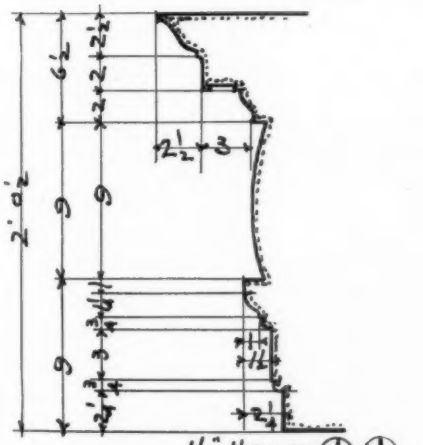
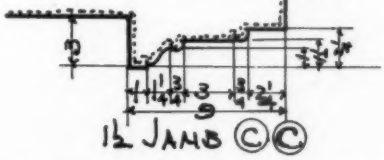
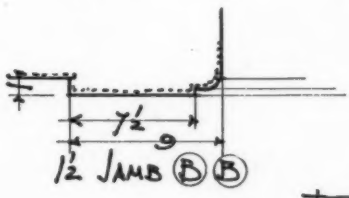






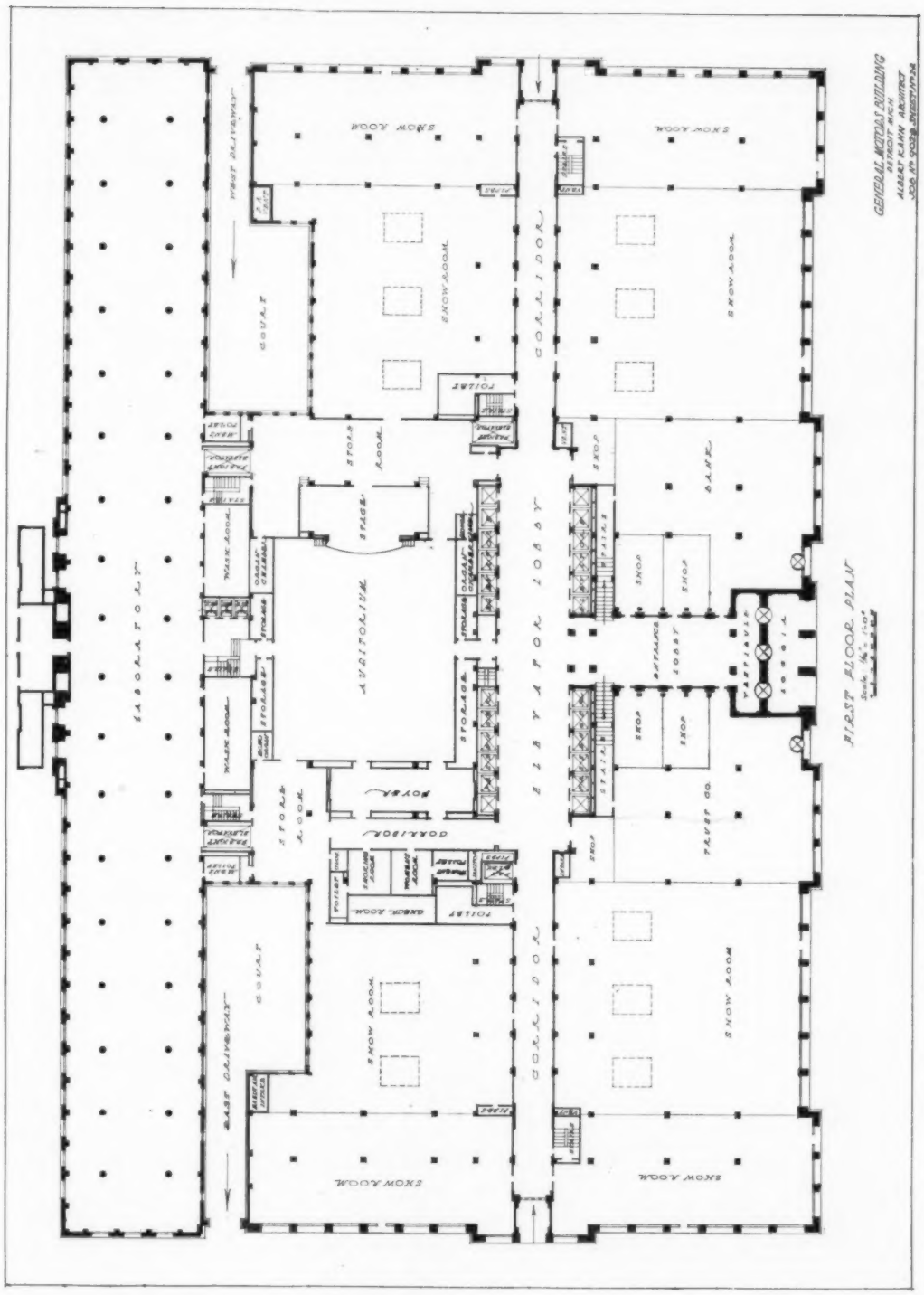




WINDOW IN THE PIAZZA MORLACCHI PERUGIA ITALY
1/21

MEASURED AND DRAWN BY R. M. BLACKALL, 35TH HOLDER, ROTCH TRAVELING SCHOLARSHIP

THE AMERICAN ARCHITECT, SERIES II.
FRENCH AND ITALIAN DETAILS



BUILDING FOR THE GENERAL MOTORS COMPANY, DETROIT, MICH.

ALBERT KAHN, ARCHITECT

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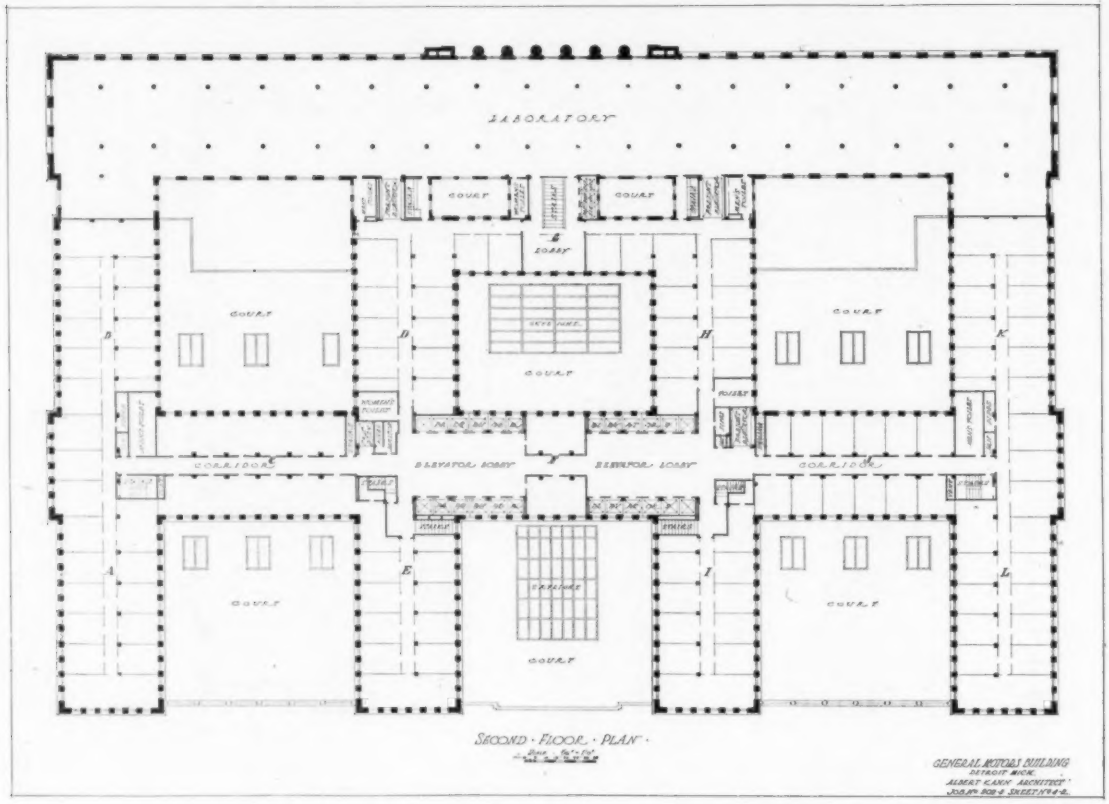

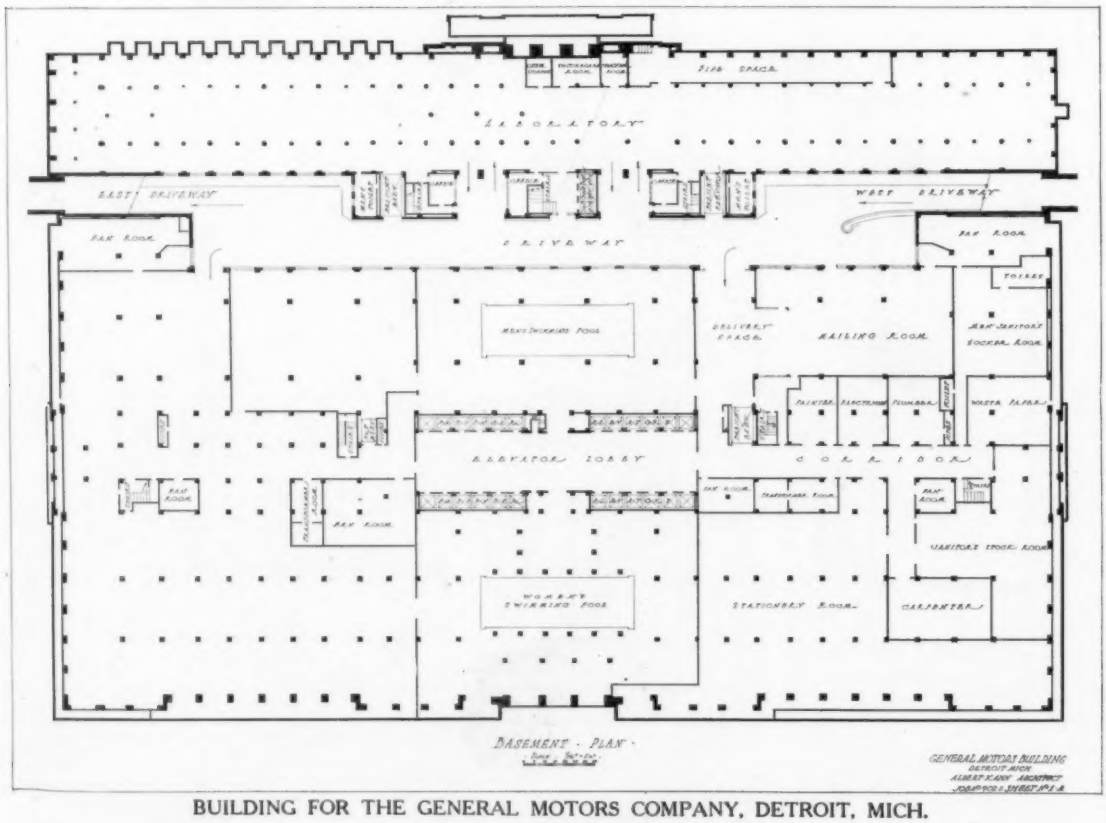

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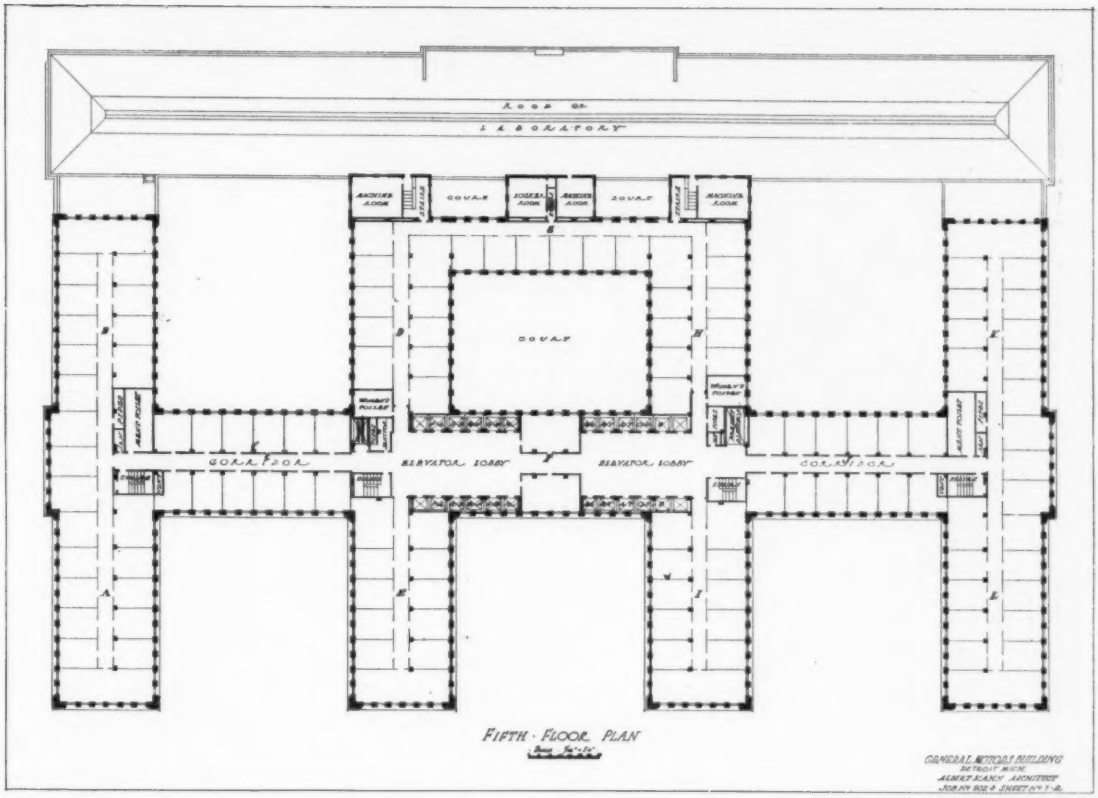

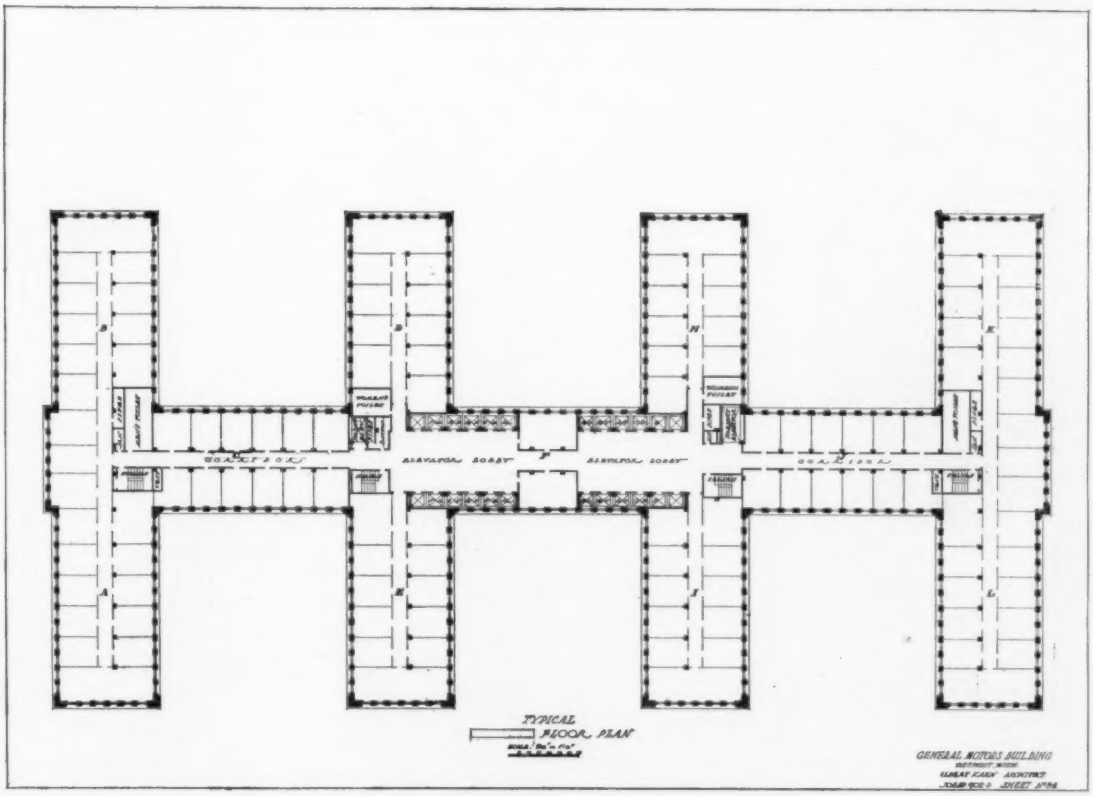

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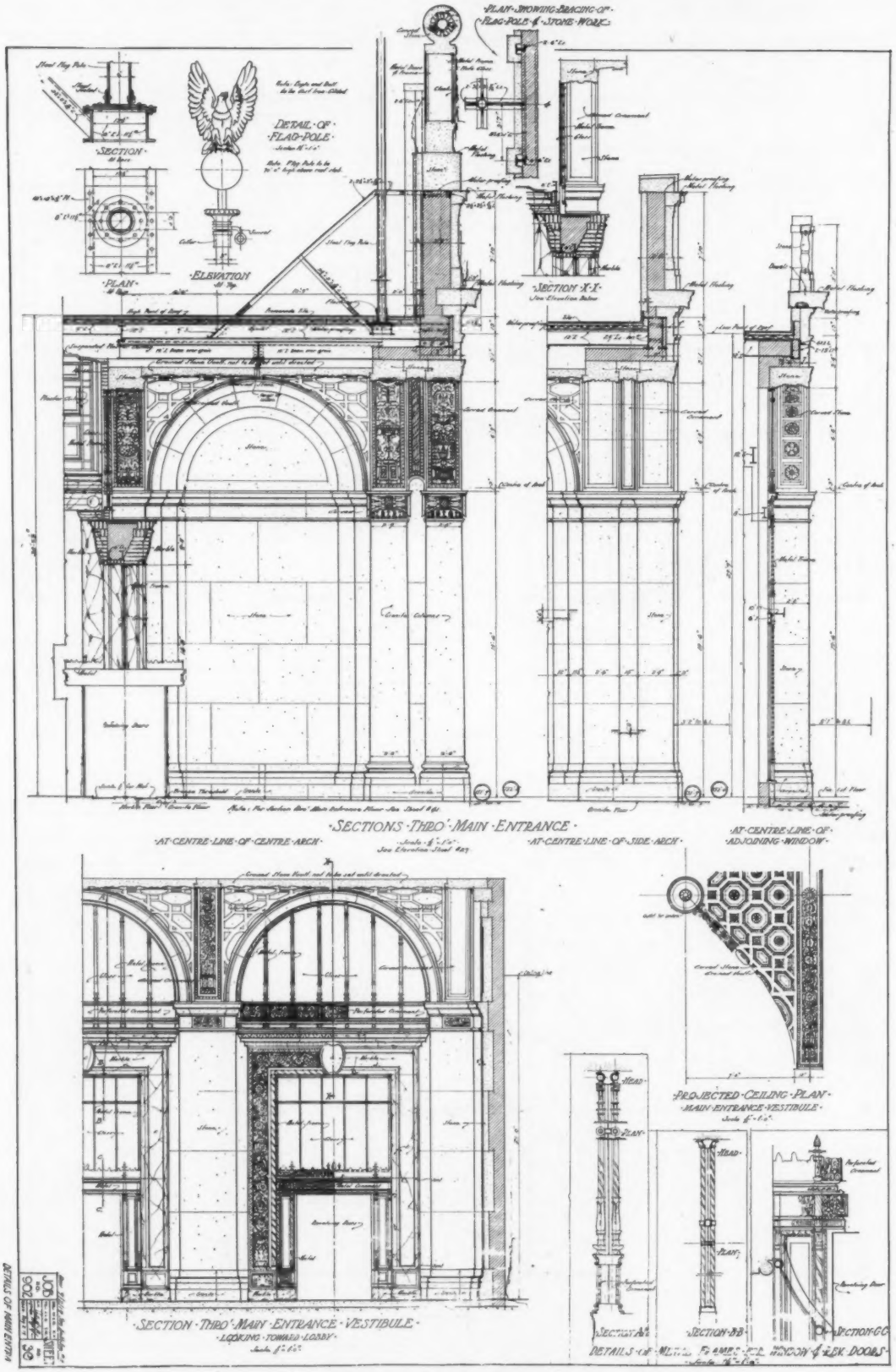

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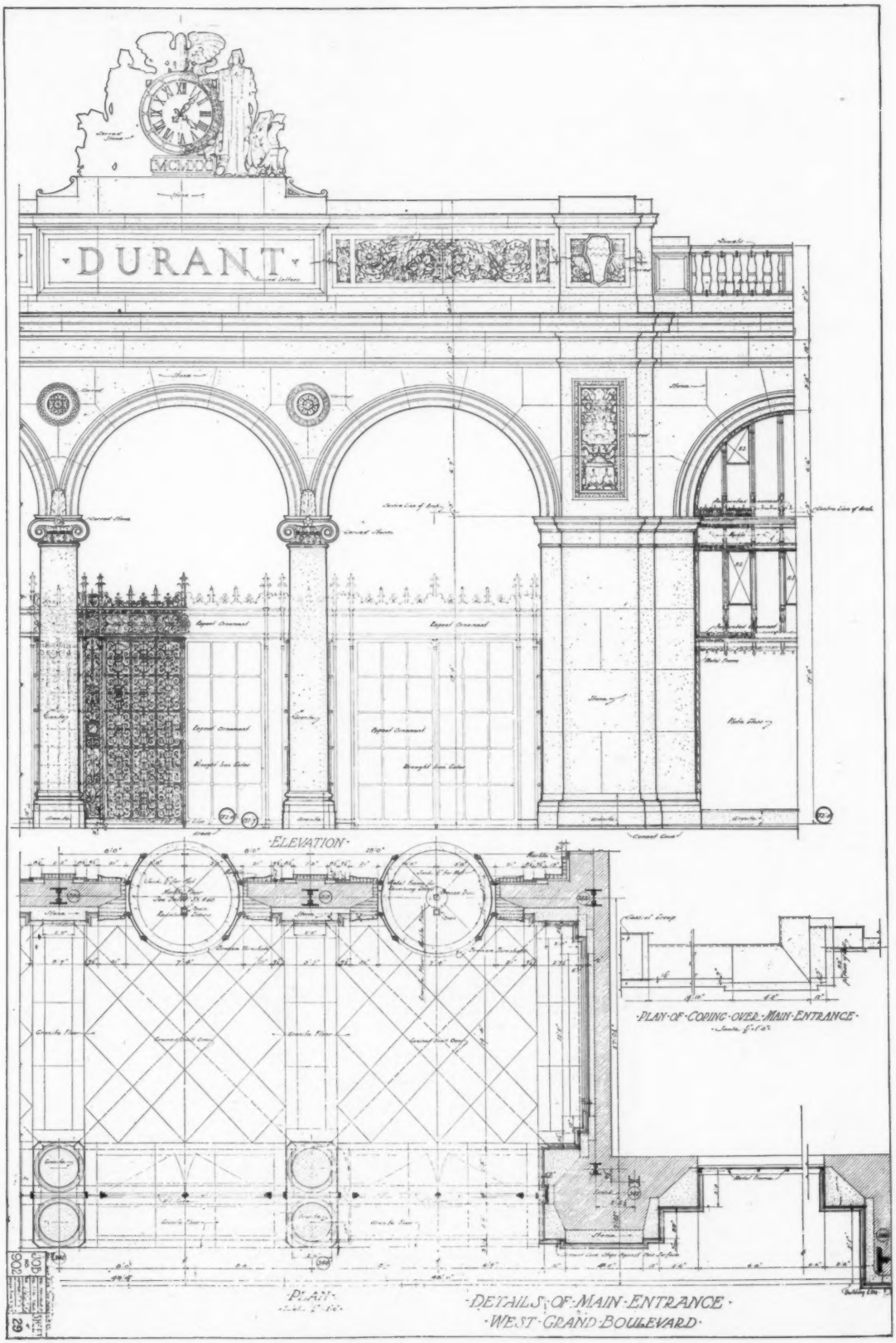

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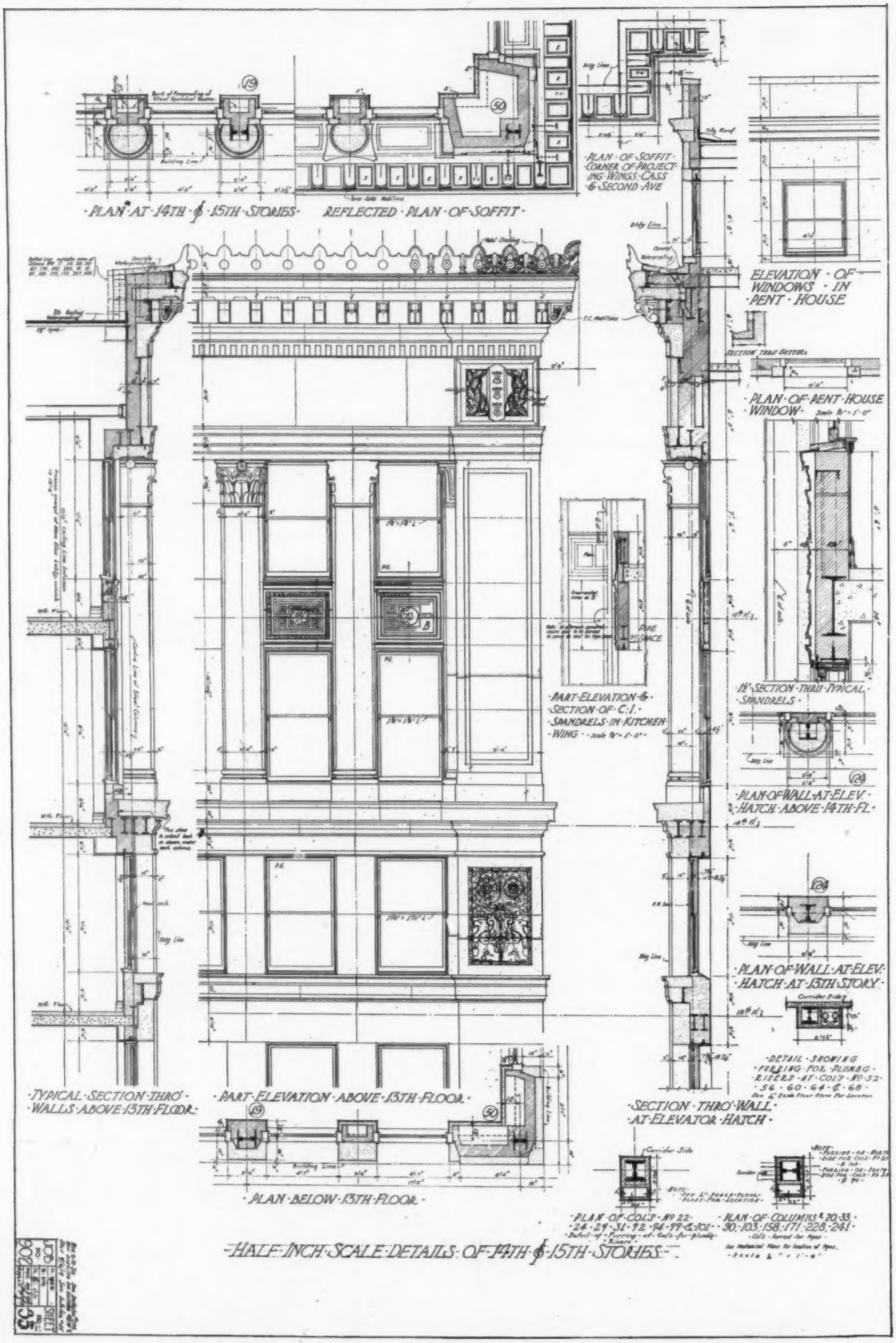
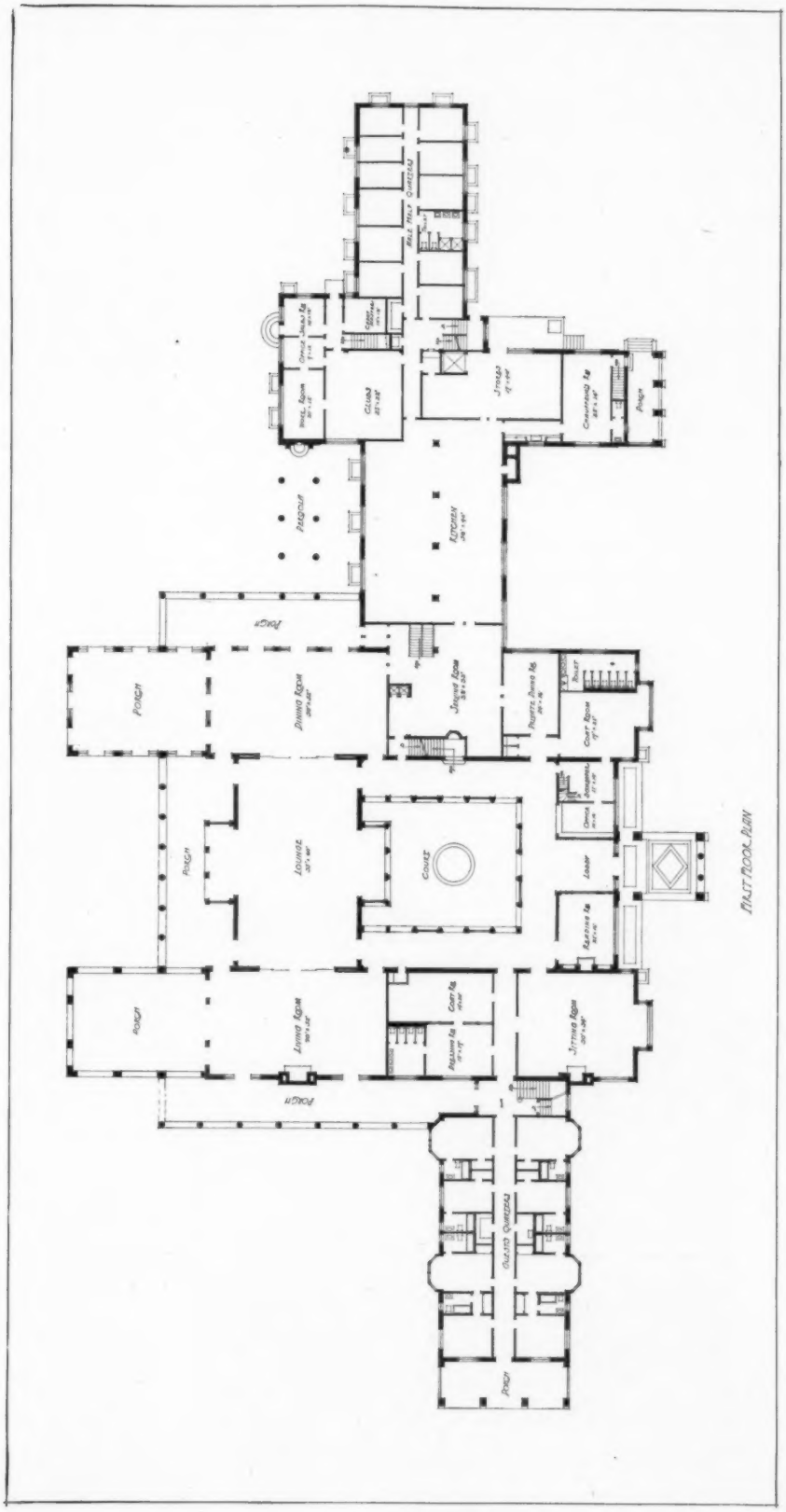

PLAN AT 14TH & 15TH STORIES
REFLECTED PLAN OF SOFFIT
PLAN OF SOFFIT CORNER OF PROJECTING WINGS CASS & SECOND AVE
ELEVATION OF WINDOWS IN PENT HOUSE
PLAN OF PENT HOUSE WINDOW
PART ELEVATION & SECTION OF C.I. SPANDRELS IN KITCHEN WING
18" SECTION THRU TYPICAL SPANDRELS
PLAN OF WALL AT ELEV HATCH ABOVE 14TH FL
PLAN OF WALL AT ELEV HATCH AT 13TH STORY
DETAIL SHOWING FRAMING FOR PLUMBG RISERS AT COLS NO 52 56 60 64 & 68
TYPICAL SECTION THRO WALLS ABOVE 13TH FLOOR
PART ELEVATION ABOVE 13TH FLOOR
SECTION THRO WALL AT ELEVATOR HATCH
PLAN BELOW 13TH FLOOR
PLAN OF COLS NO 22 24 29 31 92 94 99 & 301
PLAN OF COLUMNS & 20 33 30 103 158 171 228 241
HALF INCH SCALE DETAILS OF 14TH & 15TH STORIES
SHEET NO 93

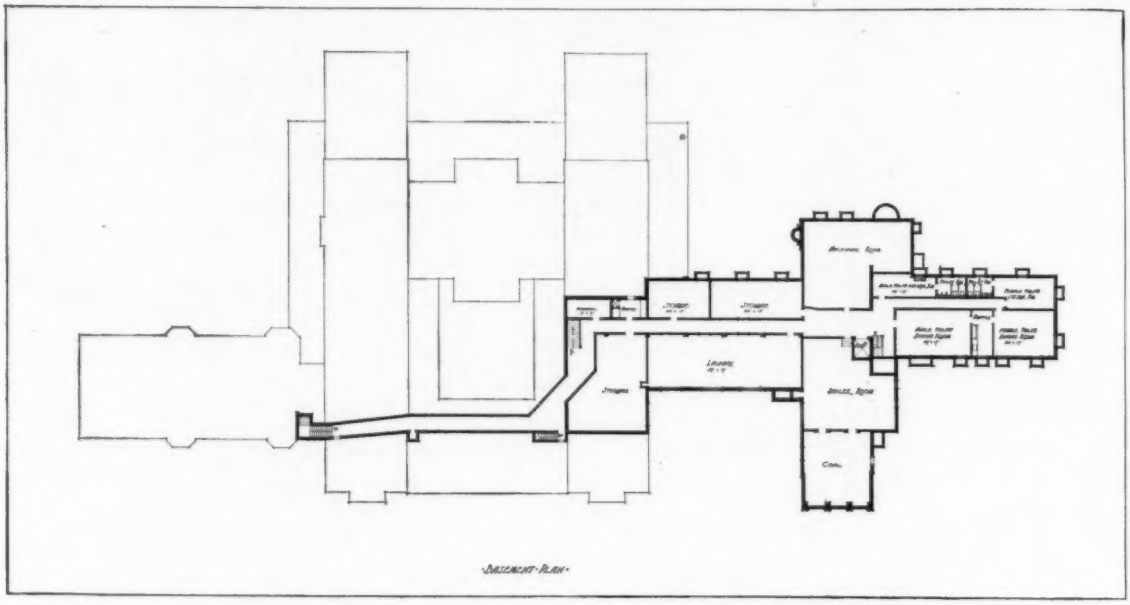
BUILDING FOR THE GENERAL MOTORS COMPANY, DETROIT, MICH.

ALBERT KAHN, ARCHITECT

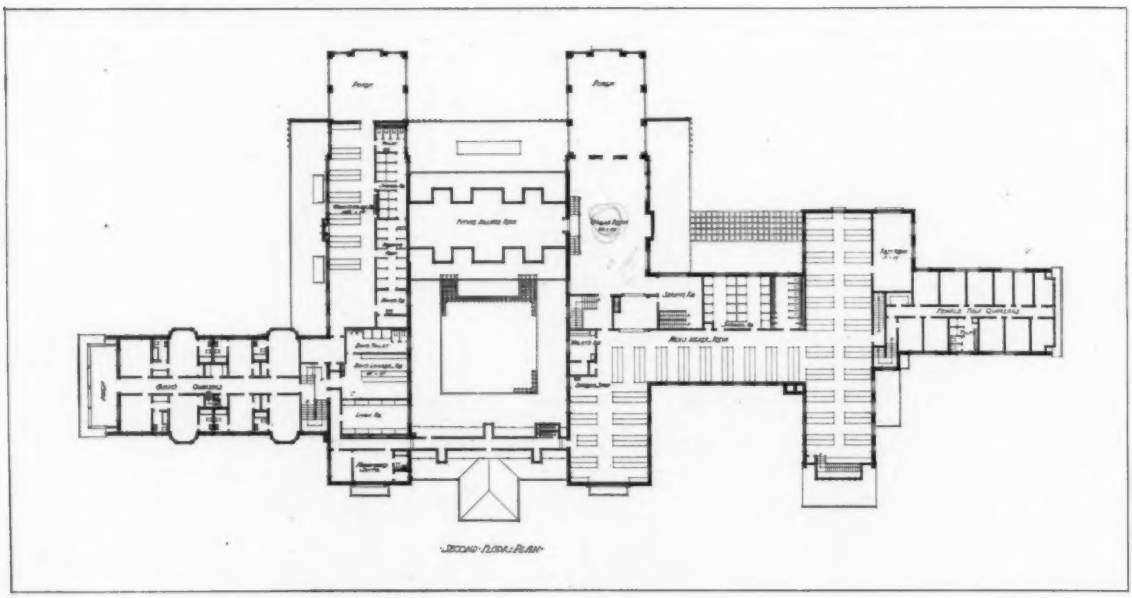


DETROIT GOLF CLUB, DETROIT, MICH.

ALBERT KAHN, ARCHITECT



BASEMENT PLAN



SECOND FLOOR PLAN

DETROIT GOLF CLUB, DETROIT, MICH.

ALBERT KAHN, ARCHITECT

NOTES ON ILLUSTRATIONS

General Motors Building, Detroit, Mich.

ALBERT KAHN, ARCHITECT

THIS building complies with the most rigid requirements for fire resistive construction. In portions of the building the frame is of reinforced concrete while in other parts protected steel framing was used. The floors are of concrete with metal tile arches. The exterior walls are of Bedford stone and ashlar brick with terra cotta backing. The main interior division walls are of terra cotta. Secondary partitions are of wood and plate glass. The roofing is of promenade tile. The trim is of walnut and hollow metal.

From the power plant of the company the building is heated by a vacuum steam heating system. A number of special fixtures are used in the lighting system which is electric. The plumbing throughout is of the best quality modern office building type. There are 27 passenger elevators and 4 freight elevators all electrically operated and of the micro-drive type.

Detroit Golf Club

ALBERT KAHN, ARCHITECT

THIS building is of ordinary construction with brick bearing walls, partitions of wood and tile and floors of wood and terrazzo. Tile is used for the roofing and all trim is wood. An indirect electric lighting system is used and the building is heated by the two-pipe steam system. The plumbing is modern with high grade fixtures and there are no elevators.

Two Examples of Rendering By Hugh Ferriss

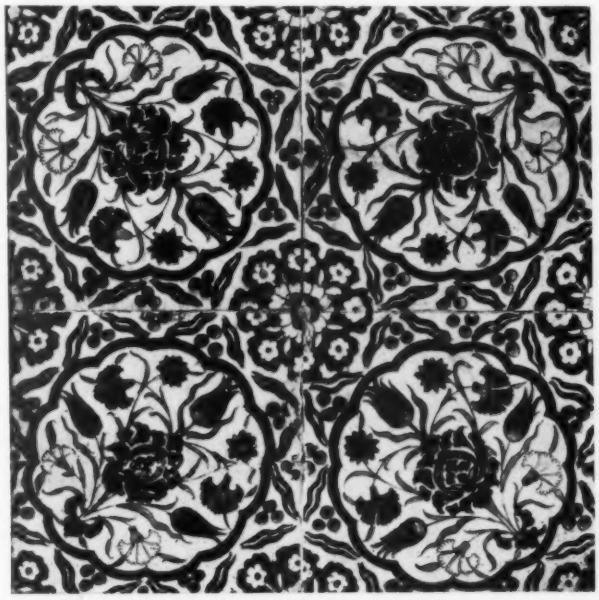
HERBERT M. GREENE COMPANY, ARCHITECTS

HUGH FERRISS needs no introduction to the architectural world, nor does his work. His method of portraying architectural work is known and recognized by architects and draughtsmen to the extent that a certain added interest is lent to projects when presented through the medium of Mr. Ferriss' hand.

In this issue are reproduced (pages 413-414) two of Mr. Ferriss' renderings which are not only splendid examples of his work, but are of further interest in that the two buildings shown are landmarks in the architectural progress of the Southwest. Both buildings are now in the course of erection in Texas, one being the First Methodist Episcopal Church, South, the "Cathedral of Southern Methodism," at Dallas, and the other being the Scottish Rite Cathedral of San Antonio. The Herbert M. Greene Company of Dallas are the architects for both structures.

The Methodist Church is the largest piece of ecclesiastical Gothic that has yet been attempted in the Southwest. The design of the Scottish Rite Cathedral is of equal interest and of equal importance in showing the trend of architectural development in the new Southwestern country.

SYRIAN TILE
XV-XVII CENTURY



From the original in Metropolitan Museum of Art

XUM

DEPARTMENT OF SPECIFICATIONS

WITH this issue the Department of Specifications will commence a detailed discussion of specifications and their component parts. These discussions will be prepared with a view to cover all branches of building construction and equipment that an architectural office will encounter. No attempt will be made to differentiate between classes of construction or design except in particular instances where special mention must be made of conditions that will vary in a marked degree from different uses of the same material or method. For instance, in the specifications for mixing and proportioning of concrete it is not necessary to vary from certain standard methods except in particular cases where some condition out of the ordinary is of such paramount importance that a variation is advisable.

Suggestions that will be given in these columns will, unless otherwise noted, apply with equal force to industrial, residential, public, mercantile or other buildings. It will not be necessary that the reader have in mind any particular class of building unless he wishes to have before him a composite structure in which there will appear practically all manner of materials and methods of construction. For that reason it may be necessary to abandon, at times, the logical sequence that generally will be followed throughout.

It is quite customary to prepare drawings for a building that is to replace old structures already on the site. These buildings must, of course, be razed, *in toto,* or perhaps only partially, in order to make way for the new structure. It seems logical, then, to start this series of discussions with the operations and conditions that must be taken care of in order to accomplish the work in an efficient manner.

DEMOLITION OF EXISTING BUILDINGS

Section One

IN all cases where there are buildings to be demolished the survey questionnaire should give all information necessary to the intelligent specification of the demolition operations. If there are adjoining buildings that have independent walls or that share in a party wall the information must be specific for a number of questions, as given later.

The method of procedure of the wrecking operations must be determined before the specifications are started and this procedure very carefully explained as the scope of the contract.

For the purposes of this discussion it will be assumed that the building to be demolished is located on an inside lot on a business street, is five stories high, with a basement under the entire building, and covers the entire area of the plot; and extends from a prominent business street in front to an alley in the rear. One side wall is a party wall while the other wall is an independent, self-supporting, load-bearing wall. All walls are of brick, floors and roof of wood joist construction, interior columns of cast iron supporting wrought iron girders and store-fronts of plate glass with cast iron setting of an ornamental nature so common in the buildings erected about forty years or more ago. The building is equipped with steam heat, electric service, plumbing pipes, fixtures and sanitary conveniences.

One of the first things to be determined is whether the owner wishes to remove any of the equipment—visible or invisible—for use elsewhere or in the new building. Ordinarily such equipment is not of any use in a new structure to be used for mercantile, office or industrial purposes, yet the owner may have use for radiators, plumbing fixtures and lighting fixtures. All plate glass may be of serviceable value in buildings of rough construction but this material can very rarely be used in new work. Signs that have been painted on plate glass will be apparent after they have been removed, the sun having caused a chemical change in the glass, causing it to turn purple or a dark gray that would not be at all desirable when placed in juxtaposition with new glass. Ordinarily old plate glass has greater salvage value to a wrecking contractor than to the average owner and should be left as a part of the general building salvage.

ANOTHER matter that needs determination at the outset is the function of the party wall and the other side property line—or self-supporting—wall. It is necessary that the party line wall be maintained in a stabile condition, not only that it may be used again but because of the property rights in it that lie with the adjoining owner. At times a party wall, through settlement or lateral movement, has come to depend on—and actually require—the support that has been given it by the lateral bracing of the floor and roof constructions. If this condition exists the removal of such laterally supporting structure will require the immediate substitution of temporary supports that may be placed so as not to interfere either with the processes of demolition or with the construction operations. If this same condition exists with respect to the free-standing property line wall on the other side due precautions must be taken to ascertain the responsibility of the owner of the

building being razed. If he has no legal responsibility that requires him to maintain the wall of the adjoining building, a spirit of fair dealing will suggest his co-operation with the adjoining owner and the rendering of all possible assistance in solving the problems involved. Certainly it will not be desirable to proceed with the demolition of this wall with the chance that a collapse will throw a great amount of debris on his property, causing immediate expense, the bother of law suits and possible delays that may cost more, in money and valuable time, than the exercise of due precaution in the shoring and temporary supporting of the wall would involve.

The third item, in point of importance, that deserves close attention, is that of the extent to which old foundation or retaining walls, such as those at the street or alley lines, are to be removed during the process of demolition. If these walls act as retaining walls and their removal consequently would lead to cave-ins and resulting damage to pavements and public highways they must be allowed to remain in place until the contractor who is to build the new foundations is prepared to do the necessary sheet piling or temporary shoring to permit their removal. If they must be left in place then it is necessary to determine their structural fitness to remain stabile if the floor system, which usually acts as a brace, is removed. Then, too, the street front wall may be supporting the public walk which covers sub-sidewalk space, with the retaining wall at the curb line. If so, it is necessary to decide if the existing walk is to remain in place just as long as new construction work will permit or if barricades are to be placed around this walk and the old work removed. In this construction, once again the question arises as to the need for keeping the existing first floor construction in place as a brace for the front basement or foundation retaining walls. It is possible that the foundations of the free-standing wall that is to be demolished extend below the foundations of the adjoining building. If this is the case, removal of the foundation wall may endanger the adjoining building and caution must be exercised, as suggested above, for such circumstance.

One additional point that should be given some consideration is the removal of the basement floor and of footings. Ordinarily these are left for removal by the contractor for excavation but in a particular case there may be very good reasons why they should be removed by the wrecking contractor.

The use of old brick in the new structure should be considered, as this material usually forms the greater part of the salvage value of an old building and the contractor will want to know whether the brick are to become his property or whether he is to clean and stack them on the premises or on nearby vacant ground that will serve as a storage yard. The use of old brick will be discussed later at the proper time, but their use generally should be determined before writing the demolition specifications.

These preliminary controlling factors having been determined, it is necessary to investigate the factors that have to do with the actual work of demolition. These factors concern the posting of a bond with the city authorities for protection of the public if the ordinances require it; the liability and compensation insurance that the contractor may have to procure for the protection of the public, his workmen and others; the erection of proper safeguards such as covered passageways over public walks, fences or other barricades and similar devices; the restrictions as to dust and efforts that must be made to prevent it from flying through the air; the removal of debris and salvaged material and the general cleaning up that must be done upon completion of the operations.

WITH respect to public liability bonds and liability and compensation insurance these matters should be classed as legal matters though they are factors with which the specification writer should be thoroughly familiar and are of particular importance in work of this nature. Coverage should be made as complete and comprehensive as possible so that all parties concerned in the operation will have protection. The architect should see that his interests, as well as those of the owner, contractors, sub-contractors, lessors and lessees are included in all insurance and bond protection.

The erection of proper safeguards and barricades has to do with the protection of the public and of workmen and will be controlled to a great extent by the requirements of local authorities and insurance companies; it also has something to do with the convenient and methodical handling of salvaged material and debris. Its arrangement and disposal should be left entirely in the control of the contractor without detailed instructions or hindrance on the part of the architect.

Flying dust resulting from demolition operations can cause quite a bit of trouble and annoyance and in many cities must be eliminated as much as possible. It annoys occupants of adjoining buildings and pedestrians and may cause accidents to workmen, either through getting in their eyes or causing mis-steps while clouding the working spaces. The control of dust is not difficult and always should be the subject of rigorous rules in the specifications.

When the demolition contractor is to leave the existing basement floors for removal by the excavation contractor it is customary to remove all rubbish resulting from the work. The specifica-

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tions should be specific on this point in order that the responsibility of its removal may be placed, with certainty, on one or the other contractor.

It is advisable, and oftentimes is required by law, that owners of adjoining properties be notified, a certain number of days before demolition work is to be started, that such work is to be done. Such notification should state whether or not the architect or owner believes certain damage may be done to the property of such owners and every assistance should be offered these owners in seeing that their buildings are not harmed in any way by the work that is to be done.

THE specifications for the demolition operations will, then, be outlined somewhat as follows:

I. General Conditions
   a. A paragraph referring the reader to the General Conditions that will be made a part of the Contract and which should be read by all bidders.

II. Scope of Contract
   a. State what material or equipment will be removed by the owner.
   b. State what material or equipment shall be removed by the contractor for delivery to the owner or for use in the new construction operations. If the latter, state whether material or equipment is to be cleaned, have nails removed or similar work done on it and where it is to be stored.
   c. State what material and equipment shall be removed by the contractor that is to become his property and that it is to be removed from the premises.
   d. State what must be done in respect to shoring or underpinning, temporarily, the walls of adjoining buildings or retaining walls or banks at streets and alleys.
   e. State length of time which is to be given the contractor, or ask that bids include a guarantee that all work will be performed in a maximum number of days to be stipulated by him in his estimate.

III. Bonds and Insurance
   a. Required by City Ordinances.
   b. Required by State Compensation laws.
   c. Required by Owner for protection of
      1. Contractor and his employees
      2. Sub-contractors and their employees
      3. Owner
      4. Architect
      5. Lessor
      6. Lessee

IV. Permits
   a. As required by city ordinances or public regulatory bodies.

V. Notification to Adjoining Owners
   a. Formal notification in writing, delivered to owners of adjoining buildings, that demolition operations are to be commenced on a certain date (say, within ten days of date of notice) and that his property must (by him or will, by the Owner of the building to be razed) be protected as required by statutes or ordinances covering such operations.

VI. Barricades and Public Protection
   a. State governing conditions that must be met by the Contractor.
   b. State what barricades must be left upon completion of Contract.

VII. Demolition Operations
   a. State that work is to be done so as not to endanger adjoining buildings, walks, streets, etc.
   b. Require that contractor cease work at places where, it seems evident, further operations will endanger such buildings or public property.
   c. State conditions respecting removal of debris, etc., that falls into basement or surrounding premises.

If specifications are prepared somewhat as outlined above they should bring a happy ending to the demolition contractor's work.

DEPARTMENT OF ARCHITECTURAL ENGINEERING

SOME PROPOSED INVESTIGATIONS IN STRUCTURAL ENGINEERING*

VII. Experimental Study of Secondary Stresses

To a large extent, secondary stresses have been neglected by practicing engineers. The engineer has justified his action by the statement that secondary stresses are small, or that the determination of secondary stresses is based upon false assumptions, and that large secondary stresses do not exist.

Inasmuch as computed secondary stresses are often very large, they should not be neglected, if they actually exist; and if they do not exist, the ghost should be laid. A limited number of tests show that secondary stresses do exist, and that the measured and computed stresses agree quite well. Tests by Parcel and Maney (Engineering News-Record, December 9, 1920, p. 1116), show a secondary stress equal to 85 per cent. of the primary stress at a time when the primary stress is a maximum. Further experimental data are desirable.

VIII. The Effect of the Elongation and Compression of the Bottom Chord Upon Stresses in the Floor System of a Through Truss Bridge

The stress in the bottom chord of a truss is a maximum at all points when the whole span is loaded. This being true the entire bottom chord can be subjected to a maximum stress at the same time. The elongation due to live load and impact stresses from the center to the end of a 200 ft. truss is approximately one-half inch. If therefore the floor system is erected with no live load on the span, the passing of a full live load over the bridge will produce a horizontal deflection in the end floor beams of one-half inch, a strain that is neglected in the design of the bridge. The bending of a floor beam also produces a horizontal shearing stress on the floor beam connection angles which is not considered in the design. Strain-gage measurements taken on bridges under actual conditions of service disclosed stresses very much in excess of the stresses produces by the vertical load on the floor beams alone.

IX. Why a More Exact Knowledge of the Behavior of Structures Is Desirable

Research work necessary to answer the questions which have been raised is expensive. Moreover, a more exact analysis of stresses in structures would probably require better trained designers and would probably require that more time be spent on the design of structures than is now customary. Both of these changes increase the cost of a design. The question is often raised, why is it necessary to incur this expense for research since our present designs are proving satisfactory in service? To accept the line of reasoning implied by this question is to accept the design of the ancients as the acme of structural science as these structures have stood through the centuries. To accept the line of reasoning implied by this question is also to eliminate economy as a controlling factor in an engineer's work.

All structures are designed with a factor of safety. That is, every member is made strong enough to carry a load greater than any load to which it is likely to be subjected. The magnitude of this factor of safety varies through a wide range. The fact that a structure has not failed in service is proof, not that the design is properly balanced, but that in trying to provide a factor of safety of from 2 to 5 the designer has succeeded in providing a factor of safety of at least one in each and every member.

If a designer were to specify a tension member having a cross-sectional area of 30 sq. in. at one end and a cross-sectional area of 20 sq. in. at the other end the design would be ludicrous. Such an evident lack of balance in the design would be ludicrous. Yet the only offense which the

**Abridged from paper by W. M. Wilson, Associate Professor of Structural Engineering, University of Illinois, published in August, 1921, Journal of the Western Society of Engineers, Chicago, Ill. Continued from page 357, November 9 issue of The American Architect.*

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designer has committed has been to provide a factor of safety of three at one point and a factor of safety of two at another point in the same structure.

Tension members are usually designed for a primary unit stress of 16,000 lbs. per sq. in. Some tension members are subjected to practically no secondary stress while others have secondary stresses equal to 50 per cent. of the primary stresses when the primary stresses are a maximum. This being true, the member which is not subjected to secondary stresses has a factor of safety 50 per cent. greater than the factor of safety in the member subjected to the secondary stresses. That is, the neglect of secondary stresses results in structures which are as badly unbalanced in design as a tension member having a sectional area 50 per cent. greater at one end than at the other. There is, however, this difference. The fact that the design is unbalanced is self evident in the one case, but is concealed by a misleading statement of the stresses in the other case. It is like two thieves of whom one is caught while the other escapes. One is counted a thief and the other is not, but they are both equally guilty.

The object of the designer should be to produce a balanced design. That is, all members of equal strategic value should have equal factors of safety. If all but one of a number of members of equal importance have a factor of safety of three, while the one member has a factor of safety of two, the material in the others in excess of that necessary to give than a factor of safety of two is wasted. And this waste is chargeable to poor design.

I have heard the statement made that so long as engineers receive as a fee a certain per cent. of the cost of the structure they will not reduce the cost at increased expense to themselves by making more careful designs. This position is comparable to the position taken by a physician who would advocate halting all medical research, as more perfect knowledge would result in better health for the community and less fees for the doctor.

Engineers bemoan the fact that their profession is so unremunerative. Yet they continue to design with a handbook and to a great extent refuse to give special problems the study which they deserve. The very fact that they accept handbook design makes it necessary for them to compete with handbook artists who do not understand the principles involved in the formulas which they use, and who make no pretense at having a professional training. Many of these handbook designers are not professional men in any sense of the word. They should be classed as mechanics. Yet so long as we are content with handbook designs we will have to compete with the handbook artist.

Many designers do not realize the source of the information which handbooks contain nor do they realize how the requirements contained in specifications are established. The well founded equations and requirements of the specifications are based upon research work of the past. Methods of design which are still in a state of flux require research work for their final determination.

I believe that what is usually known as a factor of safety should be considered as the product of two factors, one a true factor of safety, and the other a factor of ignorance. The work of our scientists has made it possible to manufacture steel where physical properties will not vary more than 5 to 10 per cent. from the standard desired. This being true, if we have a steel whose elastic limit is 32,000 lbs. per sq. in. and whose ultimate strength is 64,000 lbs. per sq. in., it certainly would be safe deliberately to plan on subjecting this steel to a stress of 24,000 lbs. per sq. in., providing we were absolutely sure that 24,000 lbs. per sq. in. is the maximum stress to which the member will ever be subjected. The ratio $\frac{32,000}{24,000} = 1.33$ (or $\frac{64,000}{24,000} = 2.66$ if the factor is based upon the ultimate strength instead of upon the elastic limit) is a true factor of safety. But because we are not sure just what load the member will be required to carry, we design for a stress of 16,000 lbs. per sq. in. The factor $\frac{24,000}{16,000} = 1.5$ is not in the true sense a factor of safety, but is in reality a factor of ignorance. We are afraid that the stress which we believe will be 16,000 lbs. per sq. in. may be 24,000 lbs. per sq. in. This factor of ignorance is a measure of the amount by which the working stress is reduced and a measure of the amount of material wasted because of a lack of knowledge of the exact stress to which a member will be subjected.

The factor of ignorance covers a lack of knowledge of the exact value of the maximum load to which the structure is subjected, and also covers our inability or our unwillingness to make an exact analysis of the stresses due to a given load. Ignorance as to the maximum value of the load in many cases cannot be eliminated; but ignorance as to the stress resulting from a given load can at least be reduced if not, in fact, entirely eliminated. The elimination of one contributing part of the factor of ignorance should justify a reduction in the factor itself, and should justify the use of higher working stresses than are now permitted.

For the benefit of those who object to increasing our present working stresses where more exact analyses are used, let me call attention to the fact that scientists who are experienced in testing materials find that it is impossible to injure structural

steel with a tensile stress of 24,000 lbs. per sq. in. In the few cases where steel structures have failed, the failure has not been because the true factor of safety was too small, but because the factor of ignorance was too small. In fact, in the case of most of the failures, the ignorance on the part of the designer was so colossal that no factor could be depended upon to offset its effect. I believe that more care in stress analysis and increased knowledge of the behavior of structures subjected to load will promote economy and safety simultaneously.

x How Structural Research Can Be Promoted

There are two interested parties in every contract for a steel structure, the manufacturer who furnishes the material and the owner who pays the bill. The manufacturer wants the structure designed so that it will be easy to manufacture and, if it is a lump sum contract, he is interested in light weights. But he knows that if the structure fails his reputation will suffer. The owner having once signed the contract wants the best bridge that he can get. But he knows that if his specifications are unreasonable he will have to pay an exorbitant price. So that while the interests of the two parties at first glance seem to conflict, they really are in harmony. Both want the lightest possible bridge that will safely carry the load. Both will be financially benefited by the development of this ideal structure.

Although manufacturers and owners will both be benefited by the development of an ideal design they are both human, and neither is always willing to believe that changes suggested by the other are for their mutual benefit. The owner is likely to question innovations in shop practice, believing them to be the product of a desire to cut shop costs rather than to increase strength. Likewise the manufacturer may consider that changes suggested by the owner, increase the cost more than they increase the quality.

It therefore seems apparent that any research work which might result in changes in design or manufacture should be conducted by a disinterested party. This is necessary in order that the results may be accepted without prejudice by both parties. Furthermore, scientific investigations require long continued painstaking efforts. Both of these requirements point to our scientific organizations such as the Bureau of Standards and the Engineering Experiment Stations as the proper agents to undertake this work.

(Note. The paper by Professor Wilson is of importance at this time when a committee of technical men is preparing a proposed national building code. The factor of ignorance must be large until greater uniformity exists in floor loads and other designing data.—Editors.)

The Gas Danger in Garages

A recent issue of *The Journal of the American Medical Association* contained valuable data on the danger of gas poisoning in closed garages when motors of cars are running, to "warm up."

An ordinary motor car, when the engine is in motion, gives off about one cubic foot of carbon monoxide every minute. One cubic foot of this gas in 670 cubic feet of air will cause a strong man to fall unconscious if he happens to breathe the mixture. If he is not taken immediately into fresh air and given remedial treatment he will die. A single car garage 10 by 16 feet in plan with an average height of 8 feet, contains 1,280 cubic feet, so all the contained air will be poisoned in less than two minutes if doors and windows are kept closed when a car inside is running.

Architects should pay great attention to the ventilation of garages and impress upon clients the fact that the poison hazard increases with the coming of winter. Ventilation must be by doors and windows and open roof ventilators. Electrically operated fans may cause an explosion of gasoline vapor by sparking. If a garage is heated it should be by steam or hot water pipes from boilers far enough removed to prevent the possibility of gasoline vapor igniting.

One cubic foot of carbon monoxide in 3,000 cubic feet of air produces no physiological effects. A mixture of 1 part of the gas in 1,500 parts of air causes some uneasiness. Above that, headache and nausea are induced, increasing in severity with the rising of the ratio until, when it reaches 1 in 670, life is seriously impaired.

Glass Standardization

STANDARDIZATION of the different kinds, qualities, and sizes of window and plate glass used as a building material and for many other purposes was discussed at a conference between glass distributors, architects, and engineers of the Bureau of Standards of the Department of Commerce held recently at the Bureau of Standards.

The nomenclature in the glass industry will be studied and an effort made to define trade terms that are likely to be used with various meanings. Data presented at the conference showed that one jobber alone stocked more than 150 sizes of single strength window glass and nearly as many sizes of double-strength window glass. It is believed that the total number of different sizes will greatly exceed this number.

Polished plate glass is now made in thicknesses ranging from one-eighth of an inch to one and one-half inch, with weights per square foot of from two to 20 pounds. But the most commonly used

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thicknesses are from three-sixteenths to five-sixteenths of an inch. Plate glass can be made in practically any size up to 250 sq. ft., with maximum dimensions not more than 12 feet by 21 feet.

Lumber Standardization

MUCH dissatisfaction with wood in general resulting in the increase of substitutes, can be traced directly to confusion in present trade names. Innumerable letters are written by the Forest Service answering queries as to the differences between two or more woods which were probably the same species, such as, "What is the difference between Arizona white pine and California white pine?" between "tupelo and gum?", between "tamarack, juniper, and hackmatack?", etc.

It is not surprising that there should be a great deal of confusion on this subject when we consider that there are at least 600 different species of trees native to the United States, of which there are approximately 100 softwoods and 500 hardwoods. There are as many as 35 to 40 species of pine, about 70 species of oak, etc. Counting the overlapping of names, the 35 to 40 species of pine alone are known by about 300 common names, or an average of eight names apiece. Longleaf pine is known by at least 29 local or generally used names, loblolly pine 23, western yellow pine 21, *ad infinitum*. The present lumber standardization movement will do much to remedy the conditions mentioned.

An Industrial Use for Periscopes

IN a recent issue *The New York Times* stated that a periscope had been designed for use in a local dry goods store. The office of the power plant engineer is many feet below the street level and the periscope will enable him to observe the top of the smoke stack while sitting at his desk. In this way he may control the feed of fuel, in this case oil, under the boilers. The amount of smoke coming from a stack is a measure of the efficiency of the firemen. When the top of the stack may be seen without leaving the office it will be possible to control the firing within close limits. The idea should be kept in mind by all power plant designers.

THE National Board of Fire Underwriters, Chicago, Ill., announces that the July, 1921, list of Inspected Mechanical Appliances and the Regulations for the Installation and Driving of Fire Pumps are ready for distribution.

Chicago Uniform Working Agreement

THE Uniform Working Agreement to be followed by contractors and union workmen in Chicago was published in full in the October, 1921 *Journal of the Western Society of Engineers*, Chicago, Ill. The agreement is based on the following principles:

1. No limitation as to the amount of work a man shall perform.
2. No restriction on the use of machinery, tools or appliances.
3. No restriction on the use of any raw or manufactured material except prison made.
4. No person shall have the right to interfere with workmen during working hours.
5. The use of apprentices shall not be prohibited.
6. The foreman shall be the agent of the employer.
7. Workmen are at liberty to work for whomsoever they see fit, but they shall demand and receive the wages agreed upon by the Joint Arbitration Board in this trade under all circumstances.
8. Employers are at liberty to employ and discharge whomsoever they see fit.

Why Lumber Is Steamed During Kiln Drying

THERE seems to be a common impression that the purpose of steaming lumber is to "remove the sap." This is far from being the fact, for when lumber is steamed it takes on moisture, as a rule, instead of giving off anything, it is stated in a recent circular from the *Forest Products Laboratory*, Madison, Wis.

The reason for steaming lumber during drying depends on when it is done, but nearly always the treatment is given for one of the following purposes—(1) to heat lumber through quickly at the start; (2) to relieve stresses which otherwise would produce checking, casehardening, and honeycombing; (3) to equalize the moisture content and condition the lumber ready for use at the end of the run; (4) to kill fungi and insects in the wood.

Forest Experiment Stations

MR. Earle H. Clapp, Assistant Forester, U. S. Forest Service, is the author of a recently issued pamphlet on forest experiment stations. It contains 34 pages, is well illustrated and discusses what forest experiment stations have done; what they need to do; why the United States needs them; where they are needed and the cost of adequate stations. Copies may be procured from the Supt. of Documents, Government Printing Office, Washington D. C., at 10 cents per copy.

A REPORT ON SEASONAL LABOR IN THE BUILDING INDUSTRY

THE accompanying "Seasonal Labor Chart" was prepared by the Boston Building Congress and relates merely to the Boston district. It is not to be considered as accurate in minor detail but is as accurate as the available statistics, which are only closely approximate to accuracy and completeness.

The chart refers to organized labor and involves some 26,500 men. If unorganized labor were added the total would probably be at least 36,000 those that are busy in summer. Those that are busy in winter, that is whose high-peak period lies between October 1st and April 1st, are the Steamfitters, Elevator Constructors, Electricians, Sheet Metal Workers and Asbestos Workers. The first three of these extend somewhat over the border line into spring and fall, but the greater part of their work is done in the winter period, for they are all indoor trades. All the others are busy in the summer period, April 1st to October 1st, and

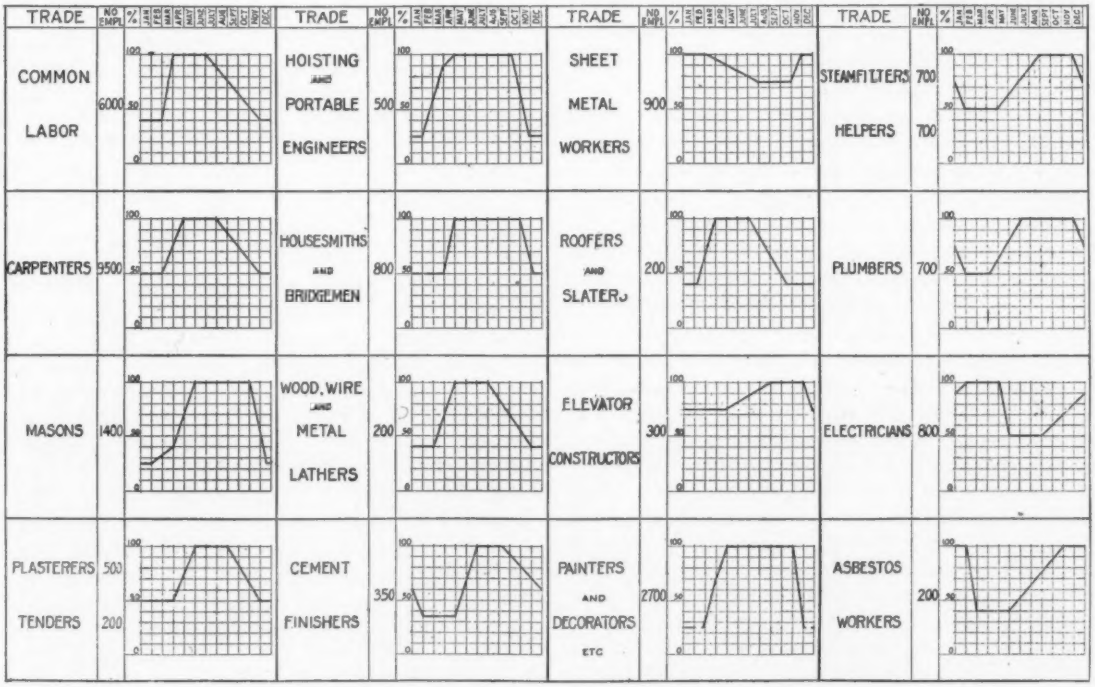

Chart showing Employment Peaks in The Building Industry in the Boston District

and the employment curves would hold for all. The chart indicates that in a normal year there is about enough work, in total, to keep 75 per cent. of the men steadily employed, or in other words, all the men in the industry are, on an average, idle for about 25 per cent. of the time, or 3 months each year. As a labor leader has aptly said, "men are paid by the hour but they live by the year." They must be paid enough in the 9 months they work to support them during the 3 months they are idle.

The chart indicates two fairly definitely marked groups, those trades that are busy in winter and at outdoor trades, with the exception of Plumbers, whose high peak extends into the early winter. Elevator Constructors and Sheet Metal Workers are the most steadily occupied, showing only 25 per cent. unemployment at the low peak.

Painters and Decorators, while they have the longest busy season, have the sharpest drop to 75 per cent. unemployment for three months. They also report the largest proportion of their work is maintenance or repair work, 60 per cent. Suggestions have been made that owners should arrange to have this work done during the normally dull period in these trades, that is, between Novem-

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ber 1st and April 1st. Were the work really maintenance or repair work, done to keep the building in the best of condition these suggestions would be valuable. Unfortunately few owners seem to spend much thought on the item of upkeep and nearly all painting and decorating on rented and leased buildings is performed under protest to hold old tenants or to attract new ones. This is the principal reason for the sudden drop about the beginning of November. Many houses are leased in May, the month in which the demand begins for painters and decorators. This keeps them busy until the commencement of regular summer work on new buildings.

Owners and all employers of labor have opportunities for better service during the low-peak periods of employment because there is little, or no, delay in getting labor, for, to quote the report, "the best skilled men are available, their attention to the work is undisturbed, and work is sought by contractors on a smaller margin of profit, all of which results to the advantage of the Owner not only in dollars and cents but in value received. At the same time the mechanics themselves are benefited by steadier employment. The best mechanic will be the man who is most steadily employed at his trade. A mechanic who loafs for three or four months each year is not so good a mechanic when at work as he would be if steadily employed, nor so good a citizen."

Business men, whose life work consists in buying and selling, finding themselves confronted with a dull market have a habit of reducing prices in order to move goods and take care of overhead. Contractors often take work at prices which include no profit in order to keep plant and organization in good condition during dull months. It is better to face a loss of prospective profits than to risk losing invested capital. So the laborers, skilled and unskilled, organized and unorganized are unemployed on an average of 25 per cent. of their time because they hold to fixed rates of pay all the time. When laboring men adopt sliding scales of payment based on the law of supply and demand less will be heard of seasonal employment in the building industry. An appeal to employ labor, merely to relieve distress and reduce waste in the employment of labor is too altruistic for men who live by bargaining. An adjustable wage scale for odd jobs will result in maintenance and repair work being done in the months when the laborers employed on such work are normally idle.

It will be interesting to see similar charts from other cities. The United States covers a territory so vast that high- and low-peak employment will vary considerably from Texas to Minnesota and from Maine to California. The problem of ironing out the curve is entirely local. Advantage cannot be taken of shifting peaks under present social conditions by transferring labor between far distant cities and none but a communist would seriously contemplate such a solution. "Better a half loaf than no loaf" and labor leaders may easily arrange for seasonal reductions in wages so there will be no danger of abuse.

Tests on Concrete Brick

IT is reported that the results of elaborate tests on concrete brick in the Testing Laboratories of Columbia University, New York, will be published in the near future. In a preliminary statement made public recently it is pointed out that: "At present the cement and concrete brick industry is handicapped to a material extent by the lack of provisions in the building codes for this new material, but before the necessary provisions in such codes can be made reliable and conclusive test data must be available. The tests now being made will furnish the necessary data."

Powdered Admixtures in Concrete

AT no time has greater interest been manifested than the present in the effect of powdered admixtures in portland cement concrete. The high price of cement leads to a desire on the part of some to effect economy by adding materials which will make what is in effect a "blended" cement; many add powdered materials to increase impermeability, while others add hydrated lime to increase "flowability." The Effect of Hydrated Lime and Other Powered Admixtures in Concrete is the title of Bulletin No. 8, Structural Materials Research Laboratory, Lewis Institute, Chicago. It contains an authorized reprint from the copyrighted proceedings of the American Society for Testing Materials, with the discussion omitted. It contains also an appendix on "Further Tests of Hydrated Lime in Concrete." The results of the tests are rather important and a copy of this bulletin should be obtained by every architect, engineer and builder. The general effect is a reduction in strength of concrete at 28 days, approximately in proportion to the quantity of admixture.

City Planning

STUDENTS of city planning problems will be interested in Report No. 2, of the Citizens' Committee on City Plan of Pittsburgh. The title is "A Major Street Plan for Pittsburgh." It contains 65 pages with many illustrations and 4 folding maps. A major street plan is described as a system of main routes of travel. Minor streets, in contrast to major streets, are described

as of local value and importance; they are tributary to the major streets; and they serve within limited areas. They would serve these purposes better if they were so arranged as to discourage through traffic from using them. This Major Street Plan involves the widening of 108 streets, compared with 98 in Cleveland, 50 in St. Louis and 119 in Detroit, as given in reports from the cities named. The miles of widening are: Pittsburgh 108, Cleveland 190, St. Louis 69 and Detroit 284. The number of new streets will be, Pittsburgh 36, mileage 22; Cleveland 37, mileage 23; St. Louis 21, mileage 17 and Detroit 87, with a mileage of 21.

Concreting in Cool Weather

"STUDIES on Cooling of Fresh Concrete in Freezing Weather" by Tokujiro Yoshida, is the title of Bulletin No. 123, Engineering Experiment Station, University of Illinois, Urbana, Ill. The discussion covering 55 pages, profusely illustrated with diagrams and curves, is of considerable value to architects, engineers and concrete specialists. The cost of the bulletin is 30 cents per copy. It should be studied in connection with Bulletin No. 81, "Influence of Temperature in the Strength of Concrete" by Prof. A. B. McDaniel, the cost of which is 15 cents.

Southern Pine

The Southern Pine Association authorizes the following for publication:

The forests of Southern Pine are found in the South Atlantic and Gulf States, stretching in an almost unbroken belt from Virginia to Texas, and comprising, according to the best available records, at the present time at least 260,000,000,000 feet of standing timber. At the present rate of cutting—10,000,000,000 to 12,000,000,000 feet a year—it would require more than twenty years to exhaust this supply not counting new growth, which has been estimated to exceed five billion feet a year, and which will be much more than that when economic conditions make closer utilization of the forest material possible.

The idea now prevalent in some quarters, that the Southern Pine forests are near depletion, is erroneous. To the contrary, Southern Pine (original growth) is and will continue to be for many years, available in large quantities, in all standard sizes and grades, and well manufactured, though there will perhaps be a falling off in production within the next six to eight years, during which various large saw mills will have cut their timber. These large mills will be succeeded by many smaller mills, which will operate in scattered tracts of timber, which, because of size and location, the present operators found it unprofitable to utilize. Much timber of the best character of virgin growth is to be found in these small tracts, and the lumber produced from such trees will average fully as high in quality as that which is now going to the market, including adequate supplies of dense structural material to guarantee many years of application.

From the best information available, it appears reasonable to expect a permanent supply of Southern Pine of between 5,000,000,000 and 6,000,000,000 feet annually. For at least twenty years the bulk of this production will be from virgin growth; afterward second growth timber will comprise a larger and larger proportion of the output of the industry.

The Housing Shortage

ACCORDING to figures furnished the National Lumber Manufacturers' Association by the Department of Commerce in a special report, the housing shortage in America on October 15 was approximately 1,000,000 homes. The bureau of census gives the normal residential construction as 310,000 structures. However, the report of the select committee on Reconstruction and Production, United States Senate, last March, assumed the higher figure of 400,000 structures. One-fifth of the normal yearly construction must be used to take the place of losses through fire, obsolescence, or alterations for other than residential purposes. Hence, taking the larger estimate of 400,000 houses per year as the normal construction, but 320,000 structures remain in ordinary times to house increased population due to immigration, births and marriages.

Terminals for Freight and Passengers

THE Board of Estimate and Apportionment, New York City, issued, in October, 1921, a preliminary report of a special committee of technical men concerning The Brooklyn-Richmond Freight and Passenger Tunnel, containing a discussion of the problems involved with four large folding maps and profile of the suggested routes.

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BOOK NOTES

Architectural Design*

THE use of the spiral in architecture and architectural decoration has been traced to the earliest times. It appears to have developed independently, although not, perhaps, originated independently, in many cultural centers. The Ionic capital, if the general laws of architectural evolution are borne in mind, appears likely to have been developed from some primitive structural form. The evolution of the capital is the subject of an interesting monograph by Mr. Rexford Newcomb, which is a distinct contribution to the subject of architectural design now engrossing the attention of many prominent architects, due to the research of Mr. Hambidge.

A careful study of this monograph is recommended to all architects who regard their profession with the seriousness it so well deserves.

**The Volute in Architecture and Architectural Decoration. By Rexford Newcomb. Being Bulletin No. 121, Engineering Experiment Station, University of Illinois. 77 pp. Ill. 6x9 in. Paper Cover. Urbana, Ill. Published by the University of Illinois. 45 cents.*

Bookkeeping*

BOOKKEEPING is a systematic record of pecuniary transactions to determine whether a business is being conducted at a profit or a loss. The importance of the subject is realized by but few teachers in schools of architecture and engineering. It is regarded as uninteresting by ninety-nine per cent. of the students. It forces an acknowledgment of its great value upon all men in business for themselves, very shortly after they leave a salary status and embark upon the choppy ocean of remuneration by fee. No man can do business who does not keep accounts and keep them properly. In construction work conditions change on every job and systems of bookkeeping adapted to shop and factory accounting are not flexible enough to meet the needs of architects, engineers and contractors. Mr. Frank R. Walker, known as the author of a book on cost estimating and a book on cost keeping for contractors, has sent in for review a small work on accounting systems for men in the building industry. It can be recommended as adequate and the systems described in the book are complete and practical.

** "Practical" Business Methods for Engineers, Contractors and Architects by Frank R. Walker. 2nd ed. 80 pp Ill. 8½x11½ in. Paper cover. Chicago, Frank R. Walker Company. 50 cents.*

Structural Design for Architects*

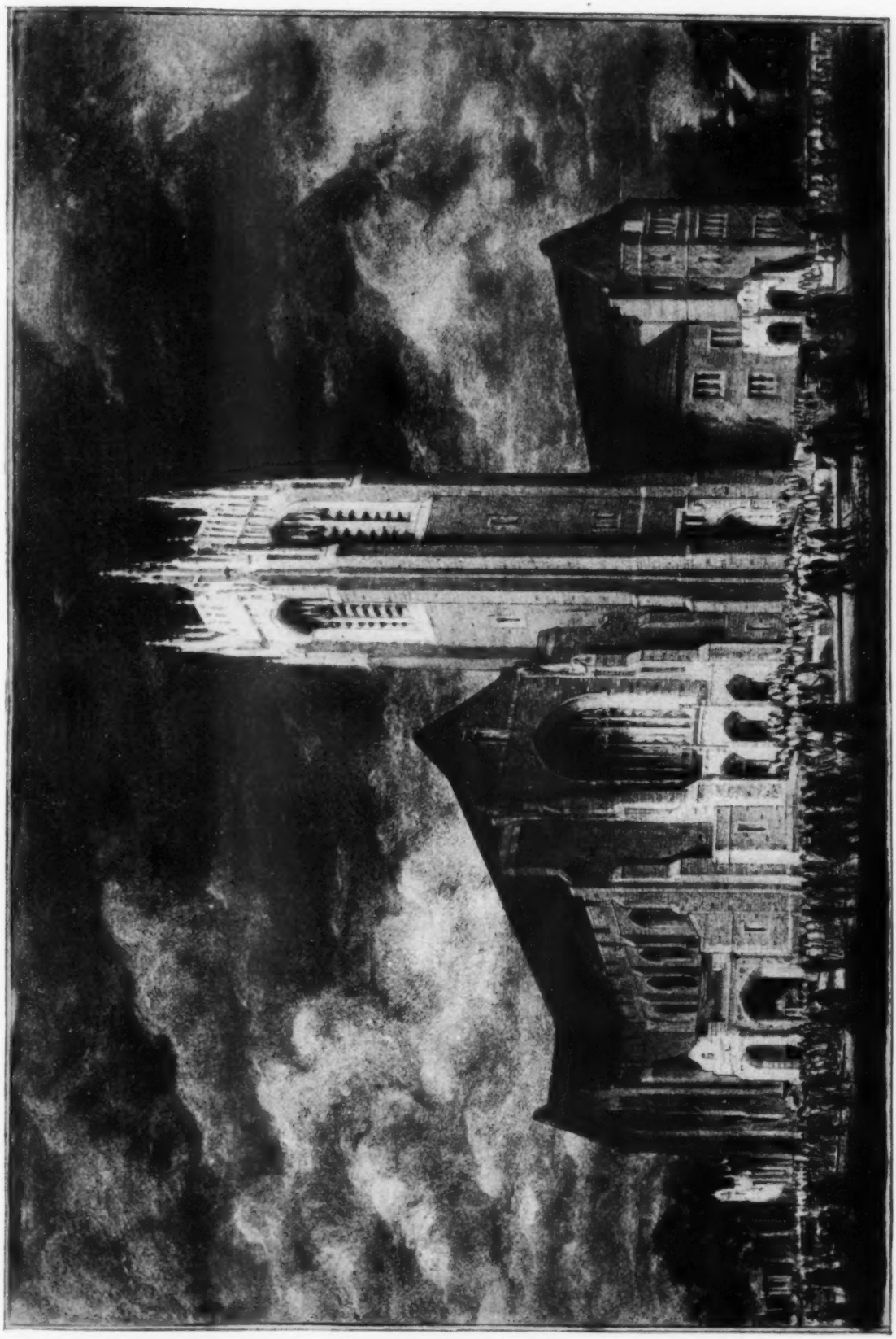
THE second edition, revised and enlarged, of a book on structural design has been received for review. An extended review is obviously precluded as the author, Colonel McCullough, is now a member of the editorial staff of this journal. From the preface one learns that the author believes that ninety-five per cent. of the work done in the design of structures can be explained to men whose knowledge of mathematics does not extend beyond that taught in High School. (For years in the intervals of a busy professional life he taught in evening schools, prepared men to take examinations in building design in order to receive licenses to practice architecture and was a well known writer on building and general structural design for technical papers.) The work treats fully of building structural design in wood and steel. The title page describes it as a text and reference work for engineers, architects, builders, draftsmen and technical schools; especially adapted to the needs of self-tutored men. The needs of self-tutored men have been kept in mind on every page. In the second edition all errors discovered in the first edition have been corrected, some pages were re-written, numerous cross references inserted and a chapter added on semi-rigid frames.

**Practical Structural Design, by Ernest McCullough, M. Am. Soc. C. E., Second Edition, Revised and Enlarged. 377 pp. 196 Figs. in text. 6x9 in. Cloth. New York, U. P. C. Book Co. $3.00.*

Practical Geometry*

FROM England comes a new book intended as a text book for the architect, surveyor, student and practical men engaged in the various branches of the building industries. It is one in the Directly-Useful Technical Series, which is to embrace books occupying a midway position between college texts in which theory is emphasized and that class of practical books in which theory is ignored. It is a cleverly prepared book on descriptive geometry in which lessons are taken from practical every-day problems. It is a good text for self-tutored men and a fine reference book for draftsmen who get into difficulties with work involving intersections of solids, as well as projections of shadows, etc.

**Practical Geometry for Builders and Architects, by J. E. Paynter, Lecturer in Building Subjects, University of London, and L. C. C. Technical Classes. New York. E. P. Dutton & Co. 409 pp. 376 ill. 6x9 in. Cloth. $8.00.*



FIRST METHODIST EPISCOPAL CHURCH, SOUTH, DALLAS, TEXAS

HERBERT M. GREENE COMPANY, ARCHITECTS

(Reproduced from the original drawing by Hugh Ferriss. *See page 401.)*

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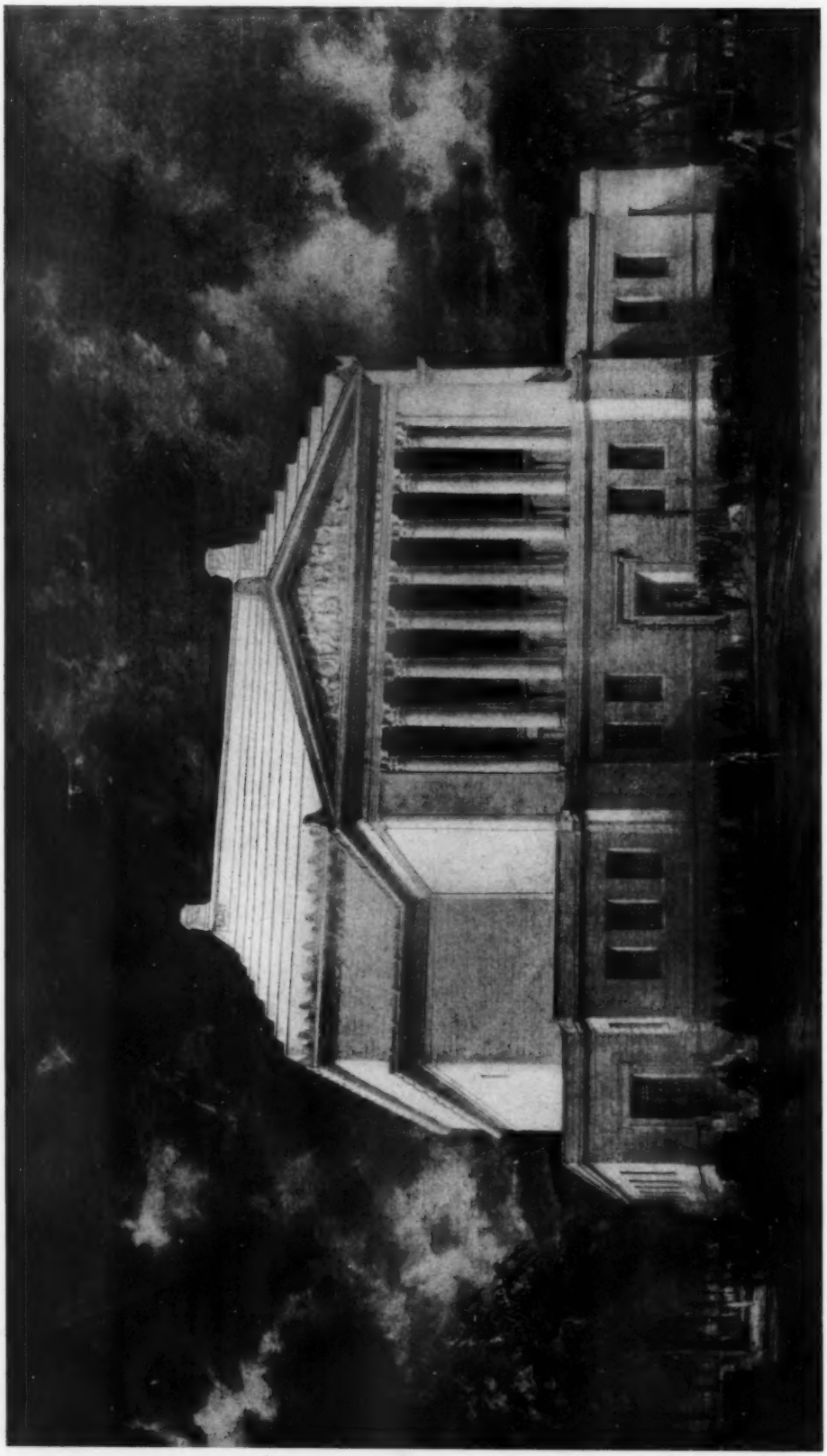

SCOTTISH RITE CATHEDRAL, SAN ANTONIO, TEXAS
HERBERT M. GREENE COMPANY, ARCHITECTS
(Reproduced from the original drawing by Hugh Ferriss. See page 401.)

THE AMERICAN SPECIFICATION INSTITUTE

127 North Dearborn Street, Chicago.

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MEMBERSHIP in The American Specification Institute is divided into four classes, as follows:

1—Active Members are persons who devote their entire time, or a part thereof, to the writing of specifications.

2—Associate Members are testing and laboratory engineers and instructors in architectural and engineering schools.

3—Honorary Members will be persons who have rendered distinguished service to the art or science of specification writing.

4—Patrons will be persons who are eligible to anyone of the first three grades but who have, in addition to the payment of annual dues, contributed to the financial support of the Institute.

Members of the following national societies are, almost without exception, eligible to membership:

The American Society of Civil Engineers.

The American Society of Mechanical Engineers.

The American Institute of Electrical Engineers.

The American Society of Refrigerating Engineers.

The American Society of Heating and Ventilating Engineers.

The American Institute of Chemical Engineers.

The American Railway Engineering Association.

The Illuminating Engineering Society.

The American Society for Testing Materials.

The American Concrete Institute.

The American Institute of Mining and Metallurgical Engineers.

The American Iron and Steel Institute.

The Engineering Institute of Canada.

The Metallurgical Society of America.

The American Institute of Architects.

The restrictions placed on membership, namely, that each candidate must be engaged to some degree, in specification work for building and engineering structures assures a membership with a single purpose—the study and improvement of specifications—and precludes the giving of attention to extraneous matters that might occur if the interests of the members were of a diverse character.

The membership fee is ten dollars and the annual dues twenty dollars, payable semi-annually, the fiscal year being from May first to April thirtieth.

The American Specification Institute is incorporated under the laws of the State of Illinois—not for profit—and is governed by a constitution and by-laws in the customary manner.

As indicated at the head of these columns the control of the Institute is vested in a Board of Governors consisting of five members. An Advisory Committee has been created to assist the Board of Governors in the discharge of its duties. This Advisory Committee will be composed of members representing each technical endeavor and an effort will be made to have each section of the United States represented. Because of the scope and nature of organization and membership of the Institute practically all activities will be conducted by correspondence. However, it is expected that by the first of the coming year a scheme of chapter organization will have been effected so that there may be chapters in all of the large cities or in any locality as soon as the sectional membership warrants them. It is possible at the present time to have chapters in Boston, New York, Philadelphia, Pittsburgh, Detroit, Chicago, St. Louis and San Francisco.

The activities of the Institute are divided into two major classes, viz:, (a) study of materials and methods and (b) study of the elements and the composition of specifications. It is highly desirable that one who writes specifications should know something of the production of raw materials and the methods of finishing and preparing them for use. Such knowledge is informative and possession of it undoubtedly will tend toward a more intelligent selection and use of materials, thus producing more economical construction. The Institute does not propose to undertake the study of raw materials—such as those that enter into the manufacture of steel, for instance—with a view to developing a specification for the manufacture of any certain basic product, but it feels that a knowledge of the physical and chemical properties

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is, in many cases, quite desirable in order to prevent useless or wasteful attempts to utilize a material that is unsuited or uneconomical for the purpose intended. The activities of the Institute may best be indicated in detail by the following outline:

1. Study of materials.
   a—The production and physical properties of raw materials.
   b—Methods of manufacturing, fabrication and finishing.
   c—Relative value based on appearance, initial cost and maintenance, effect of combinations with other materials and proper materials for various types of buildings of varying grades.
2. Methods of writing specifications.

A study will be made of:

a—The means of accomplishing complete cooperation between the drawings and specifications and determining

What methods of construction and installation should be used;

What the drawings should show or indicate;

What should be omitted for inclusion in the specifications;

b—The development of an outline or checking list.

c—The general contract conditions.

d—Specific requirements governed by local conditions.

e—Use of Standard Specifications of materials as prepared by societies and manufacturers.

f—The arrangement of specifications so as to conform to the sequence of construction and installation of the work.

g—The writing of specifications that are clear, concise, coherent and that can be understood by the courts.

h—The principles of contract law as it affects the writing of specifications.

i—Possible standardization of building codes.

Bulletins are issued by the Institute semimonthly for the use and criticism of members. When the subject matter of bulletins eventually will become a standard for the members' use, all criticisms are studied with a view to perfecting the original bulletin and it is re-issued until it seems to satisfy the requirements of all members. Each member is given a loose-leaf cover in which all bulletins are filed.

The Institute will, as soon as possible, commence the issuance of a year book which will contain all bulletins issued during the preceding year and other matter of an informative nature that will be of benefit to members.

THE ANNUAL FALL CONFERENCE

THE first Annual Fall Conference will be held on December ninth at the Engineers' Club, Chicago. There will be a banquet in the evening after which papers will be read and discussions held respecting specifications.

It is hoped that this Conference will be an innovation in that all speakers will be asked to discuss specifications frankly and without gloves, and not to pat specification writers on the back to the exclusion of honest criticisms.

A discussion of specifications as viewed by the lawyer, material man, contractor, building superintendent and estimator will present to those present critical analyses from angles of diverse character that should be of very great assistance in shaping the judgment of specification writers.

Although each member will receive a copy of the papers read it is hoped that all members who find it necessary or convenient to be in Chicago or vicinity about the time of the Conference will make it a point so to arrange their affairs that they may attend and take an active part in the proceedings.

The list of speakers and their subjects will be announced later.

NEW MEMBERS

THE following new members have been elected:

Ernest Weyland, Architect, Milwaukee, Wis.

R. J. Gaudy, Engineer, Chicago.

Clinton B. Cook, Architect, Asbury Park, N. J.

Gulick-Henderson Co., Testing Engineers, New York City, Represented by Charles S. Bilyeu.

Frank W. Nicolls, Architect, Brantford, Ontario, Canada.

Robert Marr Price, Architect, St. Louis.

George A. Ferris & Son, Architects, Reno, Nevada.

E. R. Dunlap, Architect, Detroit, Mich.

Fred F. Willson, Architect, Bozeman, Montana.

Josue Smith Solar, Architect, Santiago, Chile.

Richard S. Gregg, Architect, Peoria, Illinois.

Harry J. Reiger, Architect, Springfield, Illinois.

Thos. Farr Ellerbe, Architect, St. Paul, Minn.

Alex. S. Corrigill, Architect, Winnipeg, Man., Canada.

Prospective members and others interested in the activities of the Institute are requested to communicate with the Executive Secretary's office at the above address.

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DANIEL HUDSON BURNHAM

1846 - 1912